Bumblebee (*Bombus terrestris*) Semi-Field (Greenhouse) Study
DP Barcode: D452137 MRID No.: 50845101

DATA EVALUATION RECORD

1. CHEMICAL: Sulfoxaflor (GF-2626) PC Code No.: 005210

2. TEST MATERIAL: Sulfoxaflor (formulated) Purity: 125 g/L

3. CITATION

Authors: Tänzler, V. and M Eichler
Title: Pollination in Bumble Bees (*Bombus terrestris* L.) in Tomato Plants under Semi-field Conditions – Greenhouse Study- Final Report.
Study Completion Date: July 27, 2017
Laboratory: IBACON Institut für Biologische Analytik und Consulting IBACON GmbH; Arheilger Weg 17, 64380 Rossdorf, Germany

Sponsor: Dow AgroSciences LLC, 9330, Zionsville Road, Indianapolis, IN
Laboratory Report ID: 1126211109
MRID No.: 50845101
DP Barcode: D452137
Guideline: non-guideline

4. REVIEWED BY: Thomas Steeger, Ph.D., Senior Science Advisor
Environmental Fate and Effects Division

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Secondary Reviewer Keith Sappington, M.S., Senior Science Advisor
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Signature: **Date:** 07/10/19

5. STUDY PARAMETERS

Age of Test Organisms at Test Initiation:
Exposure Duration: Colonies monitored 5 days prior to application and for 28 days post-treatment.

6. Executive Summary:

The effects of formulated sulfoxaflor (GF-2626: 125 g/L) on bumblebees (*Bombus terrestris*) was tested using tomato plants in single greenhouse (6015 m^2) which was divided into 14 sections: 4 untreated (control); 4 treated with sulfoxaflor at 24 g as/ha/m canopy height (0.006 lbs as/A/ft canopy height) with bumblebees; 4 treated with formulated imidacloprid (Kohinor 200 SL; 20% as) at 2,000 g as/ha/m canopy height (0.544 lbs as/A/ft canopy height) with bumblebees; and, 2 colonies were used for residue monitoring where 1 was treated with sulfoxaflor at 24 g as/ha/m canopy height without bumblebees and the other was untreated (no biological measures were recorded on the residue monitoring colonies). Each section within the control, sulfoxaflor and imidacloprid groups contained a single bumble bee colony; whereas, the two sections used for residue monitoring each contained two colonies. Colonies were placed in their respective section 4 days in advance of application; colonies in the control and sulfoxaflor treatments were closed the evening in advance of application and remained so until the morning of 1 DAT; whereas colonies in the imidacloprid treatment remained open. Applications of sulfoxaflor or imidacloprid were made at full bloom; whereas controls were untreated. In the residue monitoring sections, samples were collected of pollen collected by foraging bumblebees at a day after treatment (DAT) and of tomato flowers at 0, 1, 3 and 8 DAT. Biological measures included: mortality inside the colony and at the colony entrance at -2, -1, 1, 3, 5, 7, 10, 14, 17, 21, 24 and 27 DAT; foraging activity (measured in terms of bite marks) at -2, -1, 1, 3, 5, 7, 10, 14, 17, 21, 24, and 27 DAT; and colony weight at -4, -2, -1, 1, 3, 5, 7, 10, 13, 17, 21, 24, and 27 DAT.

There were no statistical differences in total mean mortality (in and outside the colonies combined) during the pre-application phase with 0.9, 1.5 and 1.3 bees in the control, sulfoxaflor, and imidacloprid colonies, respectively. Following application (1 – 27 DAT) there were a total of 83 dead bees in the control, 55 in the sulfoxaflor treatment, and 922 in the imidacloprid treatment. Average total mortality per day from 1 – 27 DAT in the sulfoxaflor treatment was 1.4 bees/colony/day and was not statistically different from controls, which averaged 2.1 bees/colony/day. Mean total mortality per day in the imidacloprid treatment was 23.1 bees/colony/day and was significantly ($p<0.05$) higher than controls. The study noted that most dead bees were found inside their respective colonies, except for one bee in the sulfoxaflor and one bee in the imidacloprid colonies which were found outside. The highest total mortality was measured at 10 DAT with a total of 20 dead bees in the controls, 13 dead bees in the sulfoxaflor treatment; however, for the imidacloprid treatment, total mortality ranged from 122 – 139 bees from 1 – 5 DAT and fluctuated between 27 to 124 bees from 7 – 27 DAT.

There was no significant difference in foraging activity of bees in the sulfoxaflor-treated colonies compared to controls (both falling within categories 2 – 3); however, based on bite marks, bees from the sulfoxaflor-treated colonies were more active in terms of the number of visits (bite marks) to a flower. The study authors noted that closing the control and sulfoxaflor colonies until 1 DAT did not appear to have any detrimental effect on the vitality or foraging activity of the bees. Bees from the imidacloprid-treated colonies had foraging categories between 0 – 2 where 0 indicated no bite marks; however, it is important to note that unlike control and sulfoxaflor sections were bees were closed within their colonies during until 1 DAT, the imidacloprid was applied as bees were actively foraging on 0 DAT.
Colony weights at -4DAT averaged 764 g, 771 g and 753 g in the control, sulfoxaflor and imidacloprid

groups and there were no statistical differences from controls. Following treatments, there were no statistical differences in colony weight between controls and sulfoxaflor-treated colonies. At 27 DAT mean weight of control colonies was 823 g while mean weight of sulfoxaflor-treated colonies was 824 g and were not statistically different. The imidacloprid treated colonies averaged 743 g at the end of the study was were significantly less ($p<0.05$) than the controls.

No residues of sulfoxaflor above the limit of quantification (LOQ=10 µg/kg in flowers and pollen) in control samples on any of the sampling days. For sulfoxaflor-treated, 1,356 µg/kg was detected in bee-collected pollen and at 0, 1, 3 and 8 DAT, residues in flowers were 585, 149, 49, and 17 µg/kg, respectively.

This is a non-guideline study that is scientifically sound but is classified as supplemental since treatment solutions were not verified analytically.

7. ADEQUACY OF THE STUDY

A. Classification: Supplemental

B. Rationale: This study is scientifically sound but concentrations of sulfoxaflor and imidacloprid in the sprayers were not verified analytically. Ideally, control compartments should have been sprayed with the tap water used to prepare the other spray solutions. The reference toxicant (imidacloprid) should have been applied under the same conditions as the sulfoxaflor and control, i.e., while bumblebees were confined to their colonies.

C. Repairability: not applicable

8. GUIDELINE DEVIATIONS

This is a non-guideline study; however, deviations from the protocol include:

- Insufficient reference toxicant (imidacloprid; Kohinor 200 SL) was available from the original lot number (1603010268) specified in the study plan; therefore, a second lot (1601010042) was purchased to provide sufficient application material.
- The protocol specified that colonies in the control and sulfoxaflor groups were to be closed the evening preceding application on 0DAT; however, one colony (sulfoxaflor replicate 4 was not closed until the morning of 0DAT, but preceding application.
- Two sampling periods were specified for 1DAT; however, only a single sample was conducted as only a few bumble bees were foraging and it was not considered feasible to attempt collecting a second sample of pollen.
- For residue sampling the protocol specified at least 20 g samples; however, at 0, 1, 3 and 8 DAT, 10 g of flowers were collected. According to the study authors, the 10 g sample was sufficient for residue analyses.

9. SUBMISSION PURPOSE: To assess the impacts of plant protection products on the pollination

efficiency of commercially reared bumblebees (B. terrestris) in tomato greenhouses; to assess the impact of GF-2626 on the pollination activity of bumblebees in greenhouses under common agricultural practice in Southern Spain.

10. MATERIALS AND METHODS

A. **Test Organisms:**

Guideline Criteria	Reported Information
Species	Bumblebee (*B. terrestris*)
Age at beginning of test Worker bees of uniform age.	Commercially-reared colonies; bees of multiple ages
Source	Koppert Biological Systems (Spain)
Were bees from disease-free colonies?	Bees were reported to be healthy, according to typical bee keeping practice. .
Were bees kept in conditions conforming to proper cultural practices?	Colonies were commercially reared and were then acclimated to greenhouse 4 days in advance of treatments.

B. Test System

Guideline Criteria	Reported Information
Test Colonies	Single commercially reared colonies were each in a plastic nest boxes contained within a card board box. Underneath the plastic box contained the brood and a bottle sugar water; each hive was provided the sugar water since tomatoes do not produce nectar. Each colony contained approximately 110 workers; the colony had an expected life span of 5 – 6 wks.
Temperature during exposure	Range: 12.8 – 40.4°C; mean: 23.3°C
Relative humidity during exposure	Range: 43.3 – 85.1%
Lighting	Ambient lighting conditions.
	Bees were allowed to forage freely on tomato plants while

Guideline Criteria	Reported Information
Feeding	confined to the greenhouse.

C. Test Design

Guideline Criteria	Reported Information
Nominal dosage levels tested	24 g as/ha
Number of bees exposed per dosage level	Each group consisted of 4 replicates with each replicate containing a single colony
Other experimental design information	Imidacloprid (Kohinor 200 SL); 20% as All applications in control and sulfoxaflor groups were made while bees were confined to their respective colonies. Applications were carried out with a portable boom sprayer when tomatoes were in full bloom. Imidacloprid was applied while bees were actively foraging. Colonies were acclimated to the tunnels for 4 days before application of test material. In the residue monitoring sections, samples were collected of pollen collected by foraging bumblebees at a day after treatment (DAT) and of tomato flowers at 0, 1, 3 and 8 DAT. Biological measures included: mortality inside the colony and at the colony entrance at -2, -1, 1, 3, 5, 7, 10, 14, 17, 21, 24 and 27 DAT; foraging activity (measured in terms of bite marks) at -2, -1, 1, 3, 5, 7, 10, 14, 17, 21, 24, and 27 DAT; and colony weight at -4, -2, -1, 1, 3, 5, 7, 10, 13, 17, 21, 24, and 27 DAT.
Bee coloniea randomly or impartially assigned to test groups	Yes
Control	Yes Negative (water control), 4 replicates Reference Toxicant (imidacloprid 2,000 g as/ha/m canopy height), 4 replicates
Solvent control	No

Guideline Criteria	Reported Information
Total observation period and frequency of interim observations	27-day study

11. REPORTED RESULTS

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Study conducted in compliance with OECD Principles of Good Laboratory Practice standards; German Chemicals Act, Annex 1; Directive 2004/10/EC; DI-ENAC PBL.rev3; Spanish Royal Decree 1369/2000/ OECD Consensus Document No. 13; these requirements are accepted by authorities within the European Community, the U.S (EPA and FDA) and Japan (MHLW, MAFF and METI).
Observed adverse effects on bees at respective dosages	Yes, effects on mortality and sublethal effects (mortality, foraging activity) were reported for each test group.
Control and Solvent Control Mortality	No solvent control.
Were raw data included?	Yes

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Study Design Elements

Study was conducted in a 6,015 m^2 greenhouse (protocol specifies 5,000 m^2) in Almerla, Spain, used for commercial tomato (*Solanum lycopersicum*; Montenegro RZ) production. According to the study report, the greenhouse was covered in polyethylene plastic and was divided into 14 separate compartments using gauze. For biological assessments, there were 4 compartments for each treatment group: 4 controls (range 1 @ 245.7 m^2; 3 @ 294.8 m^2); 4 sulfoxaflor-treated (2 @ 294.83 m^2 and 2 @ 343.98 m^2); and, 4 imidacloprid (reference toxicant; 4 @ 294.84 m^2). For residue sampling, there were two compartments: 1 control (491.4 $m^{2)}$; and, one sulfoxaflor-treated (491.4 m^2).

Tomatoes were sown 69 days before the start of the study and were transplanted into the greenhouse (1.5 plants/m^2) 36 days before application (transplant date: August 29, 2016; there were duplicate rows of tomatoes.

One bumblebee hive was placed in the middle of each of the biological assessment compartments (protocol specifies front or back). Hives were placed 1 m above the ground in an area that was protected from light and water condensation. Colonies were acclimated for 0.5 hr prior to opening the flight holes.

The greenhouse had one data logger (TinyTag TFP-4500, Gemini Data Loggers Ltd, Chichester, West Sussex, UK) for recording climatic conditions over the entire study. On the day of application, a second data logger (AHLBORN Mess-und Regelungstechnik Gmbh) was used to record the temperature, relative humidity and soil temperature on the day of application (0DAT) in sulfoxaflor treatment replicate 4.

Sulfoxaflor was applied at a rate of 24 g a./ha/m canopy height during full flowering (BBCH 63) while bumblebees were confined to their colonies. Imidacloprid was applied at a rate of 2,000 g as/ha/m canopy height while bumblebees were actively foraging.

Applications were made using motorized spraying equipment (portable Honda knapsack sprayers) equipped with a nozzle suitable for spraying tomatoes (Albuz ATR80, green, hollow cone with a spraying pressure of 6 bar) that were calibrated to ensure the exact amount of spray application (determined by measuring residual volume in tank after application), *i.e*., 750 mL/ha/mCH. The total spray volume applied in the sulfoxaflor treatments were 28.38 L/344 m^2; 28.38 L/344 m^2; 24.34 L/295 m^2; 24.34 L/295 m^2 for the biological assessments and 40.51 L/491 m^2 for the residue assessment. For the imidacloprid treatments, 24.34 L were applied to 295 m^2 in each of the four replicates used for biological assessments.

Mortality was assessed outside the colony on 1 m^2 gauze on ground in front of colony; in-hive mortality was assessed by carefully opening the lid and removing dead bees using a forceps. Foraging activity was assessed at 100 different randomly selected flowers; each flower was ranked 0 – 4 based on bruises (bite marks) by bees using the following scale:
0: flowers not visited
1: flowers visited by one bee (1 bite mark);
2: flowers visited by multiple bees (2 or more bite marks);
3: flowers have old bite marks (bite marks turn brownish);

4: flowers over-pollinated (stamens around pistil completely brown)
Foraging assessments performed midday at approximately the same time.
Weight of the colony was assess based on the weight of the plastic box and based on the weight of the plastic box and the sugar water supply.

For residue analyses, 10 g of flowers (without or with few bite marks) were collected into plastic bags, weighed, and then stored frozen (≤-20°C) within a maximum of 6 hrs after sampling. For pollen, samples were collected from bumblebees returning back to the colony or from those actively foraging (using an exhauster or tweezers). Pollen samples were weighed and then frozen (≤-20°C) within a maximum of 6 hrs after sampling

Results

Mortality

Table 1 summarizes bee mortality across sampling days and replicates for control, sulfoxaflor-treated, and imidacloprid-treated (reference toxicant) groups. According to the study authors mortality across the three groups was similar from -2 to -1 DAT with mean values of 0.9, 1.5 and 1.3 dead bees/day in the control, sulfoxaflor and imidacloprid treatments respectively. There was no statistical difference in mortality in the sulfoxaflor and imidacloprid treatments relative to controls. The study authors reported that there were no statistical differences between control and sulfoxaflor-treated sections for any of the days assessed from 1 – 27 DAT. Overall mean bee mortality was 2.1 bees/day in the control and 1.4 bees/day in the sulfoxaflor treated and was not statistically significant based on a one-sided pairwise Welch t-test (α=0.05). The study authors noted that the foundress queen died in sulfoxaflor treatment replicate 2 on -1DAT and in control replicate 4 at 5DAT and sulfoxaflor treatment replicate 1 at 17 DAT; however, the authors stated that these losses had no effect on the vitality of the bumble bee colonies at bumblebees produce new queens.

In the imidacloprid treated sections, the authors report that mortality was significantly (paired one-sided Welch t-test $p<0.05$) different from controls on each of the assessment days except 10 DAT and 24 DAT and that the foundress queen in each of the replicates was dead by 1 DAT.

Across all of the study groups, dead bumble bees were found primarily within the colony while one bumble bee from the sulfoxaflor-treated groups and one bumblebee from the imidacloprid-treated groups was found outside the colony.

Table 1. Summary of total and mean (± standard deviation) daily bumble bee (*Bombus terrestris*) mortality by replicate in control, sulfoxaflor-treated and imidacloprid (reference toxicant) treated colonies across days after treatment (DAT). (reproduced from Table 4 of Final Report ibacon Project 112611109).

	Control Group							Test Item Group							Statistics	Reference Item							Statistics
DAT[a]	Rep. I	Rep. II	Rep. III	Rep. IV	total	mean[b]	sd[c]	Rep. I	Rep. II	Rep. III	Rep. IV	total	mean[b]	sd[c]		Rep. I	Rep. II	Rep. III	Rep. IV	total	mean[b]	sd[c]	
-2	2	1	1	1	5	1.3	0.5	7	1	1	1	10	2.5	3.0	-	5	3	1	0	9	2.3	2.2	-
-1	2	0	0	0	2	0.5	1.0	0	2	0	0	2	0.5	1.0	-	0	0	1	0	1	0.3	0.5	-
Sum DAT-2 to DAT-1	**4**	**1**	**1**	**1**	**7**	**0.9**	**0.5**	**7**	**3**	**1**	**1**	**12**	**1.5**	**1.4**	**n.s.**	**5**	**3**	**2**	**0**	**10**	**1.3**	**1.4**	**n.s.**
Day of Application DAT0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
+1	0	0	3	1	4	1.0	1.4	1	0	0	0	1	0.3	0.5	n.s.	25	31	41	30	127	31.8	6.7	*
+3	2	1	5	2	10	2.5	1.7	3	2	0	0	5	1.3	1.5	n.s.	33	25	40	24	122	30.5	7.5	*
+5	3	2	8	3**	16	4.0	2.7	2	4	1	1	8	2.0	1.4	n.s.	53	17	48	21	139	34.8	18.4	*
+7	0	0	3	6	9	2.3	2.9	1	4	1	0	6	1.5	1.7	n.s.	29	12	16	5	62	15.5	10.1	*
+10	0	4	5	11	20	5.0	4.5	0	4	5	4	13	3.3	2.2	n.s.	50	9	41	15	115	28.8	19.8	n.s.
+13	2	0	4	3	9	2.3	1.7	2	0	4	2	8	2.0	1.6	n.s.	38	15	15	18	86	21.5	11.1	*
+17	0	0	1	4	5	1.3	1.9	1	1	3	1	6	1.5	1.0	n.s.	15	16	41	19	91	22.8	12.3	*
+21	2	0	0	0	2	0.5	1.0	0	1	0	1	2	0.5	0.6	n.s.	30	16	51	27	124	31.0	14.6	*
+24	2	0	3	2	7	1.8	1.3	0	1	1	2	4	1.0	0.8	n.s.	2	4	15	8	29	7.3	5.7	n.s.
+27	0	1	0	0	1	0.3	0.5	2	0	0	0	2	0.5	1.0	n.s.	7	4	10	6	27	6.8	2.5	*
Sum DAT+1 to DAT+27	**11**	**8**	**32**	**32**	**83**	**2.1**	**1.5**	**12**	**17**	**15**	**11**	**55**	**1.4**	**0.9**	**n.s.**	**282**	**149**	**318**	**173**	**922**	**23.1**	**10.2**	*

Date of Application Day: October 07, 2016

[a]DAT = in relation to the Day of Application (= DAT0)

[b]mean values of dead bumble bees per hive; four bumble bee hives per treatment group

[c]Standard deviation

Rep. = Replicate

statistics: Welch t-test, pairwise comparison, two-sided (before application), one-sided greater (after application), α = 0.05

" - " = no assessment was performed; n.s. = not significant; * = significant compared to the control

** foundress queen was found dead inside Control Replicate IV on DAT+5; new young queen was noticed

Foraging Activity

According the study report, foraging activity (based on the bite classification scheme) was comparable (*i.e.*, the majority in categories 2 [65.9 – 71.7%] and 3 [17.9 – 25.9%]) at -3 to -1DAT in all three treatment groups. Following treatment, foraging activity in the sulfoxaflor-treated group was considered by the study authors to be similar to that of controls where sulfoxaflor-treatments had 45.1% in Category 2 and 51.4% in Category 3 while controls had 69.7% in Category 2 and 24.5% in Category 3.

Following application of imidacloprid, 50.3% of the marks fell within Category 2 and 25.2% were in Category 0 (i.e., no bite marks) and 19.4% in Category 1. The authors indicated that high mortality of foragers in the imidacloprid treatments lead to low or almost no foraging; however, at 21, 24 and 27 DAT foraging activity in the reference group is reported to have increased with shift in bite mark categories from 0 – 1 towards 2 – 3.

Hive Weight

Prior to the start of the study, all colonies were weighed as both single colony weight as an single colony weight plus sugar water reservoir. **Table 2** summarizes mean weights (± standard deviation) for colonies and colonies plus reservoir) across sampling days for control, sulfoxaflor-treated, and imidacloprid-treated groups. Mean weights from -4 to -1 DAT were 764 g for controls, 771 g for sulfoxaflor group, and 753 g for the imidacloprid group; there were no statistical differences in mean hive weights compared to controls (two-sided student t-test, paired comparison to controls; α=0.05).

According to the study authors, mean weights of single colonies in the sulfoxaflor-treated group were comparable to those in the controls and from 0 to 27DAT the colonies increased in weight by 116% in controls and 113% in the sulfoxaflor group with no statistical difference between weights in the sulfoxaflor and control colonies based on a pairwise one-sided Student t-test; α=0.05). From 0DAT to 27DAT, the overall mean weight in the control and sulfoxaflor-treatments wad 823 g and 824 g, respectively.

Mean weight of imidacloprid colonies was relatively stable after application on 0DAT and were statistically lower than controls at 7, 10, 13, 17, 21, 24 and 27 DAT (one-sided student t-test, paired comparison to controls; α=0.05).

The authors noted that weights for colonies plus sugar water decreased in all three treatment groups over time and they attributed this to the bees consuming the sugar water as a nectar source. However, the authors noted that consumption of the sugar water was lower in the imidacloprid treatment due to the high mortality of bumblebees within the hives.

Table 2. Summary of mean (standard deviation) bumblebee (*Bombus terrestris*) colony weights (colony and colony plus sugar reservoir) for control, sulfoxaflor (Tet item) and imidacloprid (Reference item) groups across sampling days after treatment (DAT). (Table reproduced from Table 5 of Final Report ibacon Project 112611109).

	Control Group						Test Item Group							Reference Item Group						
	Colony[b]			Colony + Sugar[c]			Colony[b]				Colony + Sugar[c]			Colony[b]				Colony + Sugar[c]		
DAT[a]	Mean[d]	SD[e]	[%][f]	Mean[d]	SD[e]	[%][f]	Mean[d]	SD[e]	[%][f]	Statistics	Mean[d]	SD[e]	[%][f]	Mean[d]	SD[e]	[%][f]	Statistics	Mean[d]	SD[e]	[%][f]
DAT-4	765	37.6	100	2682	32.1	100	771	28.5	100	n.s.	2691	24.2	100	754	30.7	100	n.s.	2710	33.9	100
DAT-2	762	32.7	100	2604	31.3	97	772	14.0	100	n.s.	2622	46.7	97	752	32.8	100	n.s.	2629	32.5	97
DAT-1	764	35.2	100	2569	27.9	96	770	15.8	100	n.s.	2580	31.0	96	754	33.7	100	n.s.	2600	32.0	96
Mean DAT-4 to DAT-1	764	1.5	-	2618	58.1	-	771	1.3	-	n.s.	2631	56.0	-	753	0.9	-	n.s.	2646	57.0	-
DAT0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DAT+1	769	47.4	100	2521	22.7	94	782	16.4	101	n.s.	2510	19.8	93	749	32.6	99	n.s.	2563	26.5	95
DAT+3	783	50.1	102	2469	25.9	92	792	18.3	103	n.s.	2447	20.0	91	758	32.6	100	n.s.	2543	35.7	94
DAT+5	792	56.3	103	2425	36.0	90	807	22.1	105	n.s.	2394	21.1	89	749	30.3	99	n.s.	2534	38.4	94
DAT+7	808	52.3	106	2372	44.6	88	803	38.5	104	n.s.	2343	27.2	87	744	28.5	99	*	2530	46.8	93
DAT+10	800	62.1	105	2302	59.1	86	799	41.0	104	n.s.	2276	40.9	85	734	26.9	97	*	2516	49.8	93
DAT+13	817	63.6	107	2250	69.9	84	818	37.1	106	n.s.	2228	44.6	83	729	24.4	97	*	2498	53.7	92
DAT+17	840	63.0	110	2182	80.5	81	841	43.0	109	n.s.	2158	54.2	80	728	28.7	97	*	2482	60.7	92
DAT+21	864	63.1	113	2099	87.6	78	860	39.8	111	n.s.	2084	68.6	77	736	37.3	98	*	2442	79.8	90
DAT+24	875	64.7	114	2036	98.2	76	865	45.8	112	n.s.	2021	78.9	75	743	52.7	99	*	2390	102.3	88
DAT+27	886	71.7	116	1987	108.7	74	873	47.6	113	n.s.	1971	93.7	73	762	64.2	101	*	2342	124.7	86
Mean DAT+1 to DAT+27	823	40.7	-	2264	185.5	-	824	32.9	-	n.s.	2243	183.5	-	743	11.5	-	*	2484	72.0	-

Date of Application Day: October 07, 2016

[a]DAT = in relation to the Day of Application (= DAT0)

[b] Colony = weight of the plastic nest box [g]

[c] Colony + Sugar = weight of the plastic nest box + sugar water supplier [g]

[d]mean values per treatment group[g]; four bumble bee hives per treatment group

[e]Standard deviation

[f] in relation to the first assessment on DAT-4

statistics: Student t-test, pairwise comparison, two-sided (before application), one-sided smaller (after application), α = 0.05

n.s. = not significant; * = significant compared to the control

The study authors concluded that no biologically relevant adverse effects on pollination activity by bumblebees were observed in the sulfoxaflor-treatment relative to untreated controls and that neither mortality nor hive weight were affected as well when tomatoes were treated under greenhouse conditions with a single application of sulfoxaflor at 24 g as/ha/mCH. Colonies exposed to imidacloprid (Kohinor 200 SL) applied at a rate of 2,000 g as/ha/mCH exhibited adverse effects on mortality, foraging activity.

With respect to residue measurements, the authors reported that residues in flowers and pollen from the control group were below the LOD of 0.69 µg/kg. Residues in the sulfoxaflor treatment reported declined during the sampling period where samples taken at 0DAT were 585 µg/kg and were at 149, 49 and 17 µg/kg on 1, 3 and 8 DAT. Residue in pollen from the sulfoxaflor-treated group was 1,356 µg/kg at 1 DAT.

Statistical Analysis

Data on the number of dead bees and colony weight (colony alone; colony plus sugar reservoir) were analyzed using the Statistical Analysis System (SAS®; SAS Institute, Cary, NC; version 9.3) using both paired t-test (PROC TTEST) and nonparametric (PROC NPAR1WAY) Kruskall-Wallace test (see **Appendix A** for SAS® output). There were no statistical differences between control and sulfoxaflor-treated colonies across any of the time points (DAT) evaluated.

Reviewer Comments

Certificate of analysis indicates purity of GF-2626 at 99.7% with 11.8% active ingredient. Concentrations of sulfoxaflor and imidacloprid in their respective application solutions were not verified analytically; therefore, exposure is based on nominal and not measured application rates. Control compartments were untreated; however, ideally, they should have been sprayed with the tap water used to prepare the sulfoxaflor and imidacloprid spray solutions. Also, ideally, the bumblebee colonies used in the imidacloprid treatments should have been treated similar to those in the control and sulfoxaflor groups. Either all study colonies should have remained closed until 1DAT or all colonies should have been open at the time of application on 0 DAT.

The application rates used in the study, *i.e.*, 24 g/ha/m canopy height for sulfoxaflor and 2,000 g/ha m canopy height for imidacloprid are unusual ways of expressing the rate. These rates translate to sulfoxaflor application rates of 0.006 lbs as/A/ft of canopy height and for imidacloprid, 0.544 lbs as/A/ft of canopy height; however, it is uncertain how these rates compare to field application rates which are not in terms of canopy height.

Given the compartment sizes specified, controls comprise approximately 1,375 m^2, sulfoxaflor-treated comprise 1,769 m^2 and imidacloprid-treated comprise 1,180 m^2 representing a total of 4,325 m^2 (~72%) of the 6,015 m^2 greenhouse. The study indicates that the various sections (treatment groups) were separated using gauze; however, no information is provided as to how much separation there was between the different replicates and treatment groups. While residue monitoring did not detect sulfoxaflor residues above the LOQ in control residue monitoring plot, there is uncertainty as to how cross contamination may have been minimized given that a single greenhouse was used for all three groups as the location of the residue monitoring sections relative to the biological assessment sections has not been specified and residue monitoring was not conducted in the sections used for biological assessments.

The study reports that the foundress queen was lost in two of the sulfoxaflor treatments (one at -1DAT and the other at 17DAT) and one of the controls (at 5DAT). Although the study authors indicate that this

had no effect on the bumblebee colony vitality and that bumblebees produce new queens, the foundress queen is mated and is producing both worker and male (drones); whereas, a new queen from this colony would likely be unmated and only produce drones. This however would not likely affect the study results during the period over which it was conducted.

Residue analyses in pollen and flowers were conducted using liquid chromatography coupled with tandem mass spectroscopy (LC/MS/MS). The LOQ is reported as 10 µg/kg and the limit of detection (LOD) is reported as 0.69 µg/kg. Flower samples collected from control groups on at 0, 1, 3 and 8 DAT had sulfoxaflor concentrations less than the LOD while pollen samples from controls were <LOD at 1DAT. Recovery of spiked samples at 0.01, 0.1, and 1 mg sulfoxaflor/kg were at 101, 109 and 96%, respectively. The decline in composite residues in flowers (585 µg/kg, 149, 49 and 17 µg/kg at 0, 1, 3 and 8 DAT) indicates that by 1 DAT, residues had declined by 75% by 1DAT and that by 8DAT, residues had declined by 97%. No information is provided on storage stability and how the ~6 hrs between sample collection and freezing of samples may have influenced residues.

Conclusions

Following application of formulated sulfoxaflor (11.8% active ingredient) at a rate of 24 g as/ha/m canopy height (0.006 lbs as/A/ft canopy height) to greenhouse tomatoes at full bloom, there were no significant differences in bumblebee mortality, foraging activity, or colony weight in sulfoxaflor-treated bees relative to controls over the 27-day study. Sulfoxaflor residues in tomato flowers declined from 585 µg/kg at 0DAT to 17 µg/kg by 8DAT. Bees in tomatoes treated with the imidacloprid formulated product Kohinor 200 SL; 20% as exhibited significant ($p<0.05$) increases in mortality and reductions in both foraging activity and hive weight relative to controls. The study is classified as supplemental since exposure was not verified in the spray solutions used to apply the various treatments.

Appendix A—Statistical Analysis (SAS Output)

The SAS System

The MEANS Procedure

GROUP=C DAT=-4

Variable	Mean	Std Dev
DEAD	.	.
WEIGHT	765.2500000	37.5976506
WT2	2682.00	32.1247568

GROUP=C DAT=-2

Variable	Mean	Std Dev
DEAD	1.2500000	0.5000000
WEIGHT	762.2500000	32.6840940
WT2	2603.50	31.2996273

GROUP=C DAT=-1

Variable	Mean	Std Dev
DEAD	0.5000000	1.0000000
WEIGHT	763.5000000	35.1615320
WT2	2568.50	27.8866754

GROUP=C DAT=1

Variable	Mean	Std Dev
DEAD	1.0000000	1.4142136
WEIGHT	768.7500000	47.3664790
WT2	2521.00	22.7009545

GROUP=C DAT=3

Variable	Mean	Std Dev
DEAD	2.5000000	1.7320508
WEIGHT	783.0000000	50.1464522
WT2	2469.00	25.8585898

GROUP=C DAT=5

Variable	Mean	Std Dev
DEAD	4.0000000	2.7080128
WEIGHT	792.0000000	56.3264296
WT2	2424.50	35.9675780

GROUP=C DAT=7

Variable	Mean	Std Dev
DEAD	2.2500000	2.8722813
WEIGHT	807.7500000	52.3091770
WT2	2371.75	44.5897970

GROUP=C DAT=10

Variable	Mean	Std Dev
DEAD	5.0000000	4.5460606
WEIGHT	799.7500000	62.1416393
WT2	2302.25	59.1178202

GROUP=C DAT=13

Variable	Mean	Std Dev
DEAD	2.2500000	1.7078251
WEIGHT	817.0000000	63.6186555
WT2	2250.25	69.9350890

GROUP=C DAT=17

Variable	Mean	Std Dev
DEAD	1.2500000	1.8929694
WEIGHT	840.0000000	63.0185158
WT2	2182.25	80.4544385

GROUP=C DAT=21

Variable	Mean	Std Dev
DEAD	0.5000000	1.0000000
WEIGHT	863.7500000	63.1103531
WT2	2099.25	87.6180157

GROUP=C DAT=24

Variable	Mean	Std Dev
DEAD	1.7500000	1.2583057
WEIGHT	875.0000000	64.6735392
WT2	2036.00	98.1529419

GROUP=C DAT=27

Variable	Mean	Std Dev
DEAD	0.2500000	0.5000000
WEIGHT	886.0000000	71.7263318
WT2	1986.75	108.6872424

GROUP=I DAT=-4

Variable	Mean	Std Dev
DEAD	.	.
WEIGHT	753.7500000	30.7286511
WT2	2710.00	33.9116499

GROUP=I DAT=-2

Variable	Mean	Std Dev
DEAD	2.2500000	2.2173558
WEIGHT	752.0000000	32.8329103
WT2	2628.75	32.5102548

GROUP=I DAT=-1

Variable	Mean	Std Dev
DEAD	0.2500000	0.5000000
WEIGHT	753.5000000	33.7293146
WT2	2600.00	32.0312348

GROUP=I DAT=1

Variable	Mean	Std Dev
DEAD	31.7500000	6.7019898
WEIGHT	749.0000000	32.5883415
WT2	2563.25	26.4748308

GROUP=I DAT=3

Variable	Mean	Std Dev
DEAD	30.5000000	7.5055535
WEIGHT	757.5000000	32.5832268
WT2	2543.25	35.7059752

GROUP=I DAT=5

Variable	Mean	Std Dev
DEAD	34.7500000	18.3734410
WEIGHT	748.5000000	30.2930135
WT2	2534.25	38.3785965

GROUP=I DAT=7

Variable	Mean	Std Dev
DEAD	15.5000000	10.0829890
WEIGHT	744.2500000	28.4648907
WT2	2529.50	46.8294779

GROUP=I DAT=10

Variable	Mean	Std Dev
DEAD	28.7500000	19.8389348
WEIGHT	733.7500000	26.8623032
WT2	2516.00	49.8196748

GROUP=I DAT=13

Variable	Mean	Std Dev
DEAD	21.5000000	11.0905365
WEIGHT	728.7500000	24.3909136
WT2	2498.25	53.7052139

GROUP=I DAT=17

Variable	Mean	Std Dev
DEAD	22.7500000	12.2848145
WEIGHT	728.2500000	28.6516434
WT2	2482.00	60.6794858

GROUP=I DAT=21

Variable	Mean	Std Dev
DEAD	31.0000000	14.6287388
WEIGHT	736.0000000	37.3184494
WT2	2441.75	79.8096694

GROUP=I DAT=24

Variable	Mean	Std Dev
DEAD	7.2500000	5.7373048
WEIGHT	743.0000000	52.7446680
WT2	2389.75	102.2623261

GROUP=I DAT=27

Variable	Mean	Std Dev
DEAD	6.7500000	2.5000000
WEIGHT	761.7500000	64.1735927
WT2	2341.50	124.6715685

GROUP=S DAT=-4

Variable	Mean	Std Dev
DEAD	.	.
WEIGHT	771.2500000	28.4765986
WT2	2690.50	24.1729877

GROUP=S DAT=-2

Variable	Mean	Std Dev
DEAD	2.5000000	3.0000000
WEIGHT	772.0000000	14.0237893
WT2	2622.25	46.7216937

GROUP=S DAT=-1

Variable	Mean	Std Dev
DEAD	0.5000000	1.0000000
WEIGHT	769.5000000	15.8429795
WT2	2579.50	30.9892454

GROUP=S DAT=1

Variable	Mean	Std Dev
DEAD	0.2500000	0.5000000
WEIGHT	782.2500000	16.3783394
WT2	2509.75	19.8053023

GROUP=S DAT=3

Variable	Mean	Std Dev
DEAD	1.2500000	1.5000000
WEIGHT	791.7500000	18.2825053
WT2	2446.75	20.0062490

GROUP=S DAT=5

Variable	Mean	Std Dev
DEAD	2.0000000	1.4142136
WEIGHT	806.5000000	22.1284131
WT2	2393.50	21.0633964

GROUP=S DAT=7

Variable	Mean	Std Dev
DEAD	1.5000000	1.7320508
WEIGHT	803.0000000	38.5140667
WT2	2343.25	27.1707563

GROUP=S DAT=10

Variable	Mean	Std Dev
DEAD	3.2500000	2.2173558
WEIGHT	799.0000000	40.9878031
WT2	2276.25	40.9338898

GROUP=S DAT=13

Variable	Mean	Std Dev
DEAD	2.0000000	1.6329932
WEIGHT	817.5000000	37.1169323
WT2	2228.00	44.6094160

GROUP=S DAT=17

Variable	Mean	Std Dev
DEAD	1.5000000	1.0000000
WEIGHT	840.7500000	42.9602529
WT2	2158.25	54.2363654

GROUP=S DAT=21

Variable	Mean	Std Dev
DEAD	0.5000000	0.5773503
WEIGHT	859.7500000	39.8277541
WT2	2083.50	68.5589770

GROUP=S DAT=24

Variable	Mean	Std Dev
DEAD	1.0000000	0.8164966
WEIGHT	864.7500000	45.8430293
WT2	2020.50	78.9282374

GROUP=S DAT=27

Variable	Mean	Std Dev
DEAD	0.5000000	1.0000000
WEIGHT	872.5000000	47.6410187
WT2	1970.75	93.7421108

SUMMARY OF MEAN NUMBER OF DEAD BEES, COLONY WEIGHT, AND TOTAL COLONY WEIGHT BY GROUP AT DAYS AFTER TREATMENT

Obs	GROUP	DAT	REP	DEAD	WEIGHT	WT2
1	C	-4	1	.	755	2640
2	C	-4	2	.	759	2674
3	C	-4	3	.	729	2704
4	C	-4	4	.	818	2710
5	C	-2	1	2	745	2569
6	C	-2	2	1	756	2585

Obs	GROUP	DAT	REP	DEAD	WEIGHT	WT2
7	C	-2	3	1	738	2629
8	C	-2	4	1	810	2631
9	C	-1	1	2	740	2541
10	C	-1	2	0	757	2548
11	C	-1	3	0	742	2591
12	C	-1	4	0	815	2594
13	C	1	1	0	760	2493
14	C	1	2	0	754	2513
15	C	1	3	3	725	2544
16	C	1	4	1	836	2534
17	C	3	1	2	775	2447
18	C	3	2	1	789	2454
19	C	3	3	5	723	2505
20	C	3	4	2	845	2470
21	C	5	1	3	762	2402
22	C	5	2	2	815	2405
23	C	5	3	8	732	2478
24	C	5	4	3	859	2413
25	C	7	1	0	780	2350
26	C	7	2	0	832	2338
27	C	7	3	3	751	2437
28	C	7	4	6	868	2362
29	C	10	1	0	755	2277
30	C	10	2	4	846	2246
31	C	10	3	5	738	2384
32	C	10	4	11	860	2302
33	C	13	1	2	788	2236
34	C	13	2	0	872	2175
35	C	13	3	4	741	2344
36	C	13	4	3	867	2246
37	C	17	1	0	808	2179
38	C	17	2	0	908	2085
39	C	17	3	1	769	2282

Obs	GROUP	DAT	REP	DEAD	WEIGHT	WT2
40	C	17	4	4	875	2183
41	C	21	1	2	836	2109
42	C	21	2	0	928	1990
43	C	21	3	0	789	2204
44	C	21	4	0	902	2094
45	C	24	1	2	842	2052
46	C	24	2	0	944	1911
47	C	24	3	3	802	2150
48	C	24	4	2	912	2031
49	C	27	1	0	852	2012
50	C	27	2	1	967	1854
51	C	27	3	0	805	2116
52	C	27	4	0	920	1965
53	I	-4	1	.	782	2661
54	I	-4	2	.	717	2718
55	I	-4	3	.	740	2722
56	I	-4	4	.	776	2739
57	I	-2	1	5	766	2580
58	I	-2	2	3	710	2644
59	I	-2	3	1	745	2646
60	I	-2	4	0	787	2645
61	I	-1	1	0	758	2552
62	I	-1	2	0	713	2618
63	I	-1	3	1	748	2615
64	I	-1	4	0	795	2615
65	I	1	1	25	734	2524
66	I	1	2	31	720	2574
67	I	1	3	41	747	2582
68	I	1	4	30	795	2573
69	I	3	1	33	778	2491
70	I	3	2	25	717	2559
71	I	3	3	40	746	2571
72	I	3	4	24	789	2552

Obs	GROUP	DAT	REP	DEAD	WEIGHT	WT2
73	I	5	1	53	768	2479
74	I	5	2	17	708	2550
75	I	5	3	48	743	2567
76	I	5	4	21	775	2541
77	I	7	1	29	753	2460
78	I	7	2	12	709	2550
79	I	7	3	16	738	2562
80	I	7	4	5	777	2546
81	I	10	1	50	738	2442
82	I	10	2	9	702	2544
83	I	10	3	41	728	2547
84	I	10	4	15	767	2531
85	I	13	1	38	731	2420
86	I	13	2	15	703	2522
87	I	13	3	15	720	2541
88	I	13	4	18	761	2510
89	I	17	1	15	729	2398
90	I	17	2	16	699	2507
91	I	17	3	41	718	2540
92	I	17	4	19	767	2483
93	I	21	1	30	764	2340
94	I	21	2	16	699	2464
95	I	21	3	51	709	2532
96	I	21	4	27	772	2431
97	I	24	1	2	793	2262
98	I	24	2	4	712	2420
99	I	24	3	15	685	2507
100	I	24	4	8	782	2370
101	I	27	1	7	815	2189
102	I	27	2	4	731	2378
103	I	27	3	10	686	2487
104	I	27	4	6	815	2312
105	S	-4	1	.	808	2678

Obs	GROUP	DAT	REP	DEAD	WEIGHT	WT2
106	S	-4	2	.	773	2726
107	S	-4	3	.	765	2685
108	S	-4	4	.	739	2673
109	S	-2	1	7	784	2594
110	S	-2	2	1	783	2692
111	S	-2	3	1	766	2605
112	S	-2	4	1	755	2598
113	S	-1	1	0	792	2558
114	S	-1	2	2	757	2625
115	S	-1	3	0	769	2573
116	S	-1	4	0	760	2562
117	S	1	1	1	800	2484
118	S	1	2	0	788	2532
119	S	1	3	0	780	2514
120	S	1	4	0	761	2509
121	S	3	1	3	812	2417
122	S	3	2	2	801	2458
123	S	3	3	0	771	2459
124	S	3	4	0	783	2453
125	S	5	1	2	828	2362
126	S	5	2	4	823	2404
127	S	5	3	1	790	2406
128	S	5	4	1	785	2402
129	S	7	1	1	832	2304
130	S	7	2	4	831	2346
131	S	7	3	1	799	2362
132	S	7	4	0	750	2361
133	S	10	1	0	825	2228
134	S	10	2	4	841	2257
135	S	10	3	5	753	2315
136	S	10	4	4	777	2305
137	S	13	1	2	837	2185
138	S	13	2	0	860	2194

Obs	GROUP	DAT	REP	DEAD	WEIGHT	WT2
139	S	13	3	4	790	2266
140	S	13	4	2	783	2267
141	S	17	1	1	847	2118
142	S	17	2	1	899	2107
143	S	17	3	3	812	2190
144	S	17	4	1	805	2218
145	S	21	1	0	865	2047
146	S	21	2	1	914	2009
147	S	21	3	0	833	2116
148	S	21	4	1	827	2162
149	S	24	1	0	860	1991
150	S	24	2	1	931	1926
151	S	24	3	1	833	2058
152	S	24	4	2	835	2107
153	S	27	1	2	865	1948
154	S	27	2	0	941	1851
155	S	27	3	0	832	2016
156	S	27	4	0	852	2068

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=-2

GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	1.2500	0.5000	0.2500	1.0000	2.0000
S	4	2.5000	3.0000	1.5000	1.0000	7.0000
Diff (1-2)		-1.2500	2.1506	1.5207		

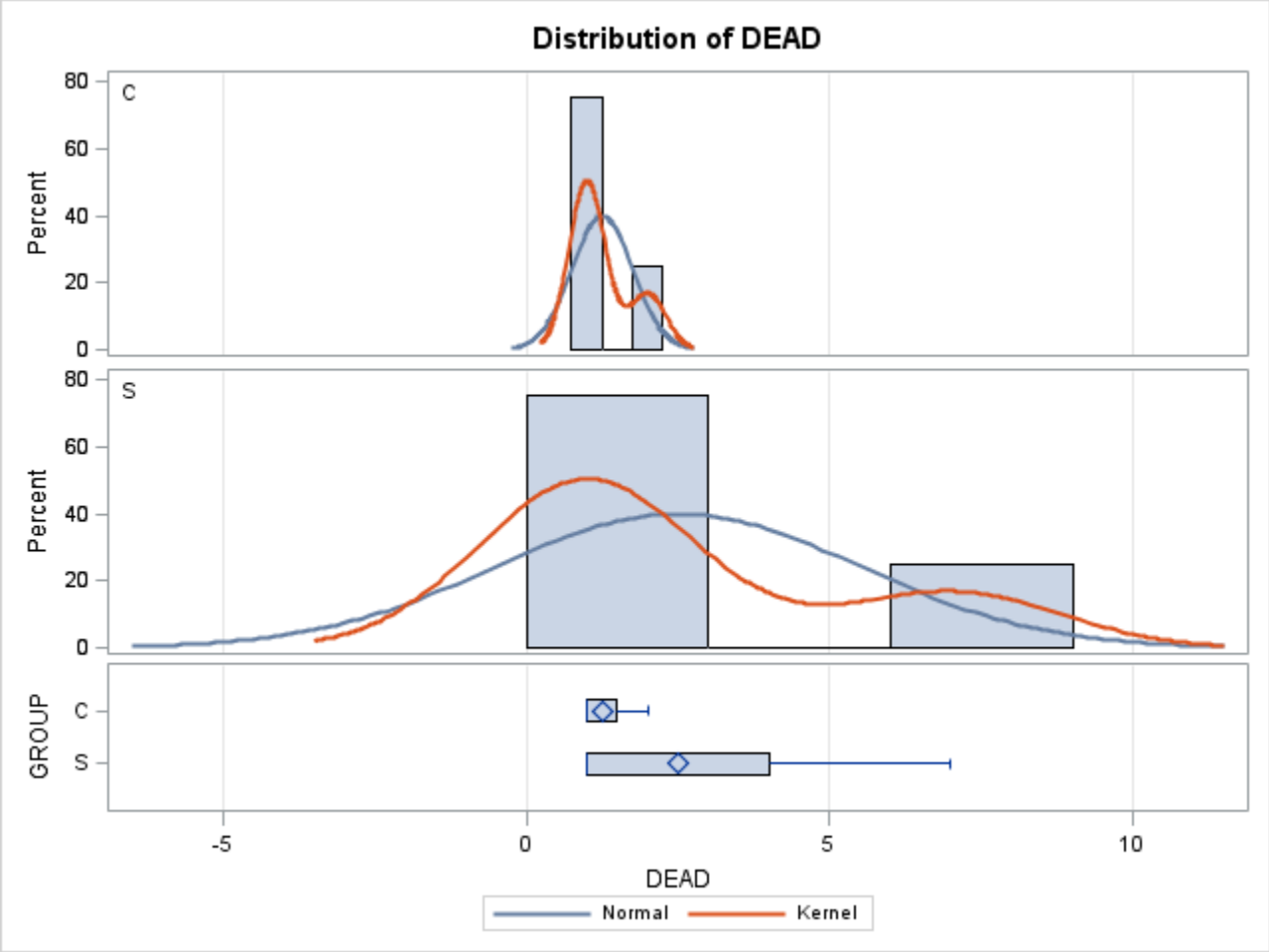
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		1.2500	0.4544	2.0456	0.5000	0.2832	1.8643
S		2.5000	-2.2737	7.2737	3.0000	1.6995	11.1856
Diff (1-2)	**Pooled**	-1.2500	-4.9710	2.4710	2.1506	1.3858	4.7357

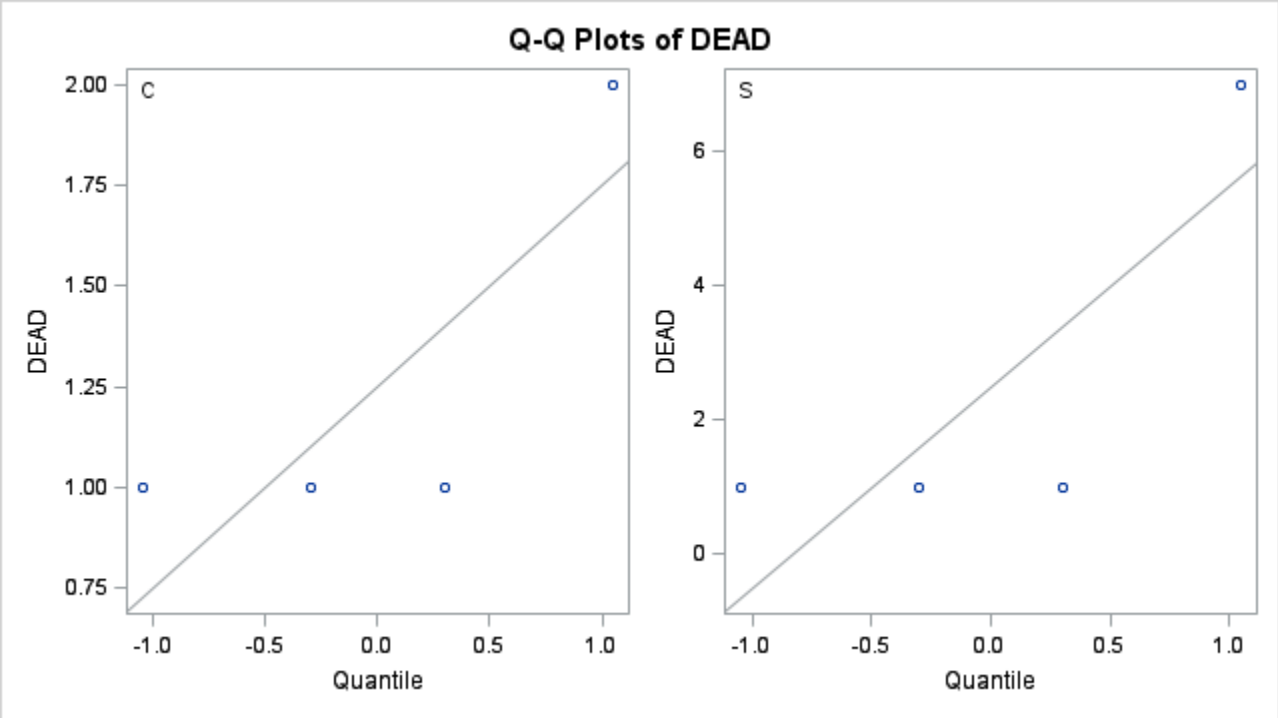
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev
Diff (1-2)	Satterthwaite	-1.2500	-5.9487	3.4487		

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.82	0.4425
Satterthwaite	Unequal	3.1665	-0.82	0.4684

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	36.00	0.0150




Q-Q Plots of DEAD
C
S
DEAD
Quantile
2.00
1.75
1.50
1.25
1.00
0.75
6
4
2
0
-1.0
-0.5
0.0
0.5
1.0

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=-1

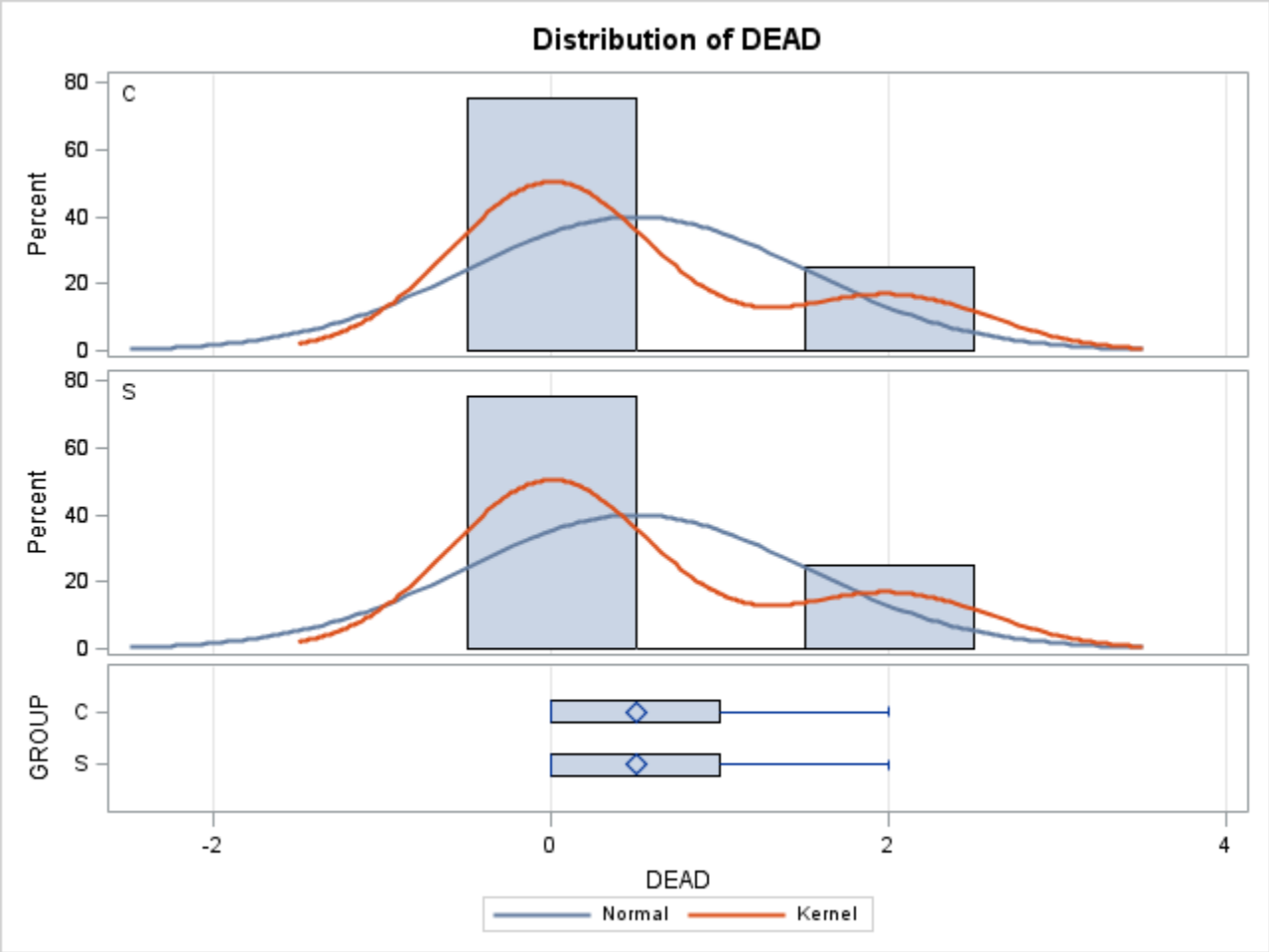
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	0.5000	1.0000	0.5000	0	2.0000
S	4	0.5000	1.0000	0.5000	0	2.0000
Diff (1-2)		0	1.0000	0.7071		

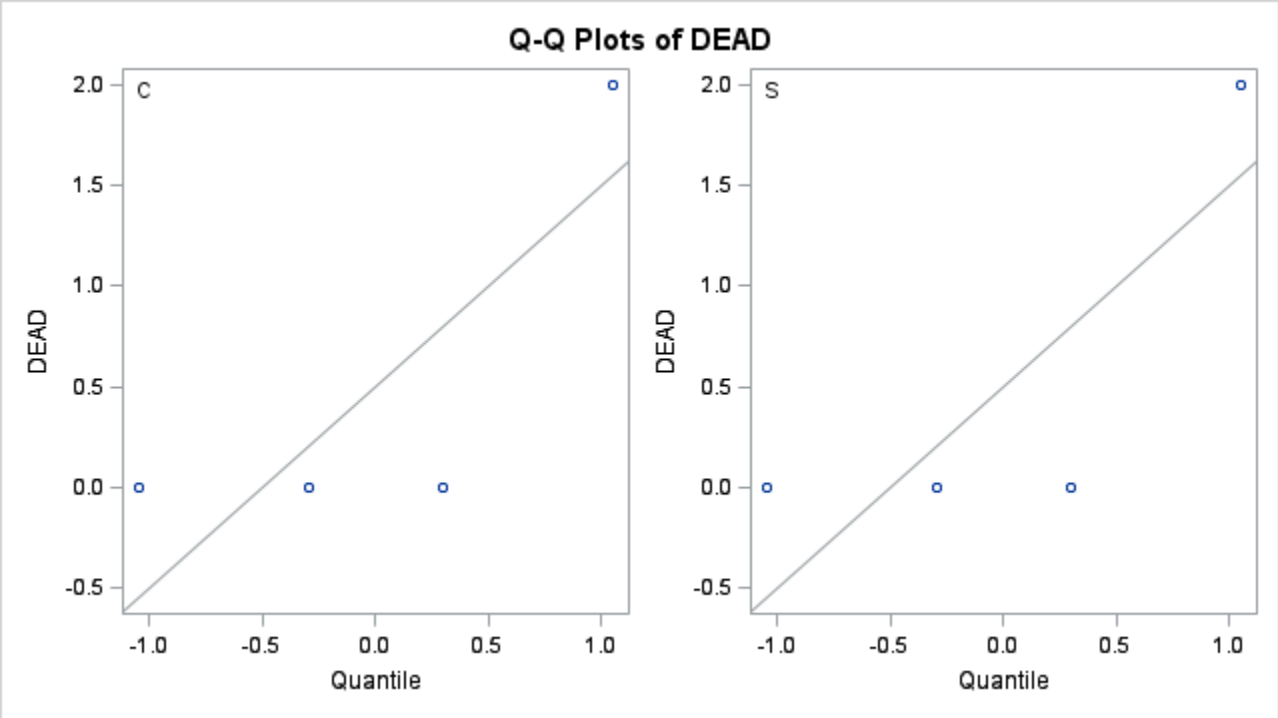
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		0.5000	-1.0912	2.0912	1.0000	0.5665	3.7285
S		0.5000	-1.0912	2.0912	1.0000	0.5665	3.7285
Diff (1-2)	**Pooled**	0	-1.7302	1.7302	1.0000	0.6444	2.2021
Diff (1-2)	**Satterthwaite**	0	-1.7302	1.7302			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.00	1.0000
Satterthwaite	Unequal	6	0.00	1.0000

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.00	1.0000


Distribution of DEAD
C
S
Percent
80
60
40
20
0
GROUP
C
S
-2
0
2
4
DEAD
Normal
Kernel



COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=1

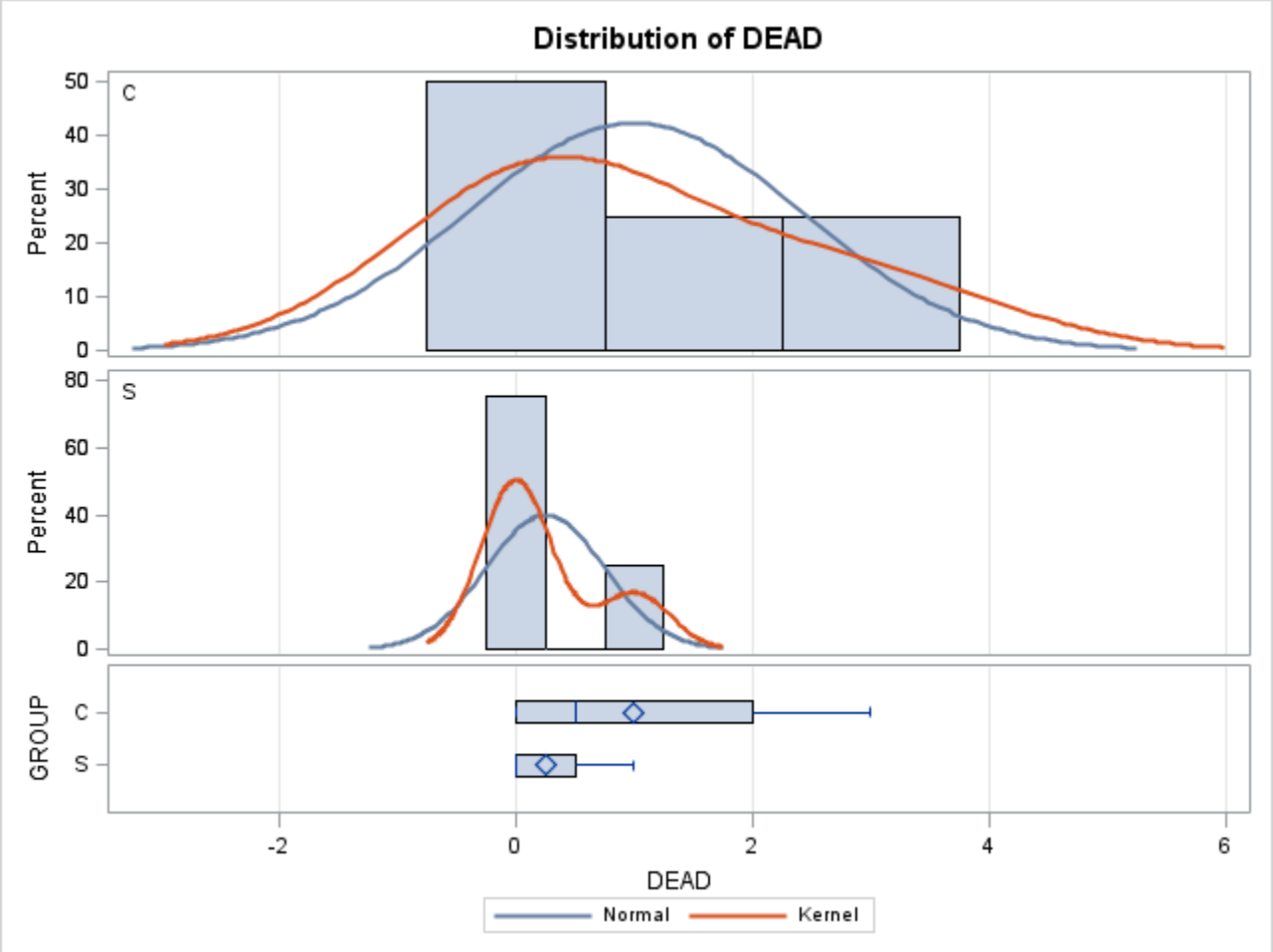
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	1.0000	1.4142	0.7071	0	3.0000
S	4	0.2500	0.5000	0.2500	0	1.0000
Diff (1-2)		0.7500	1.0607	0.7500		

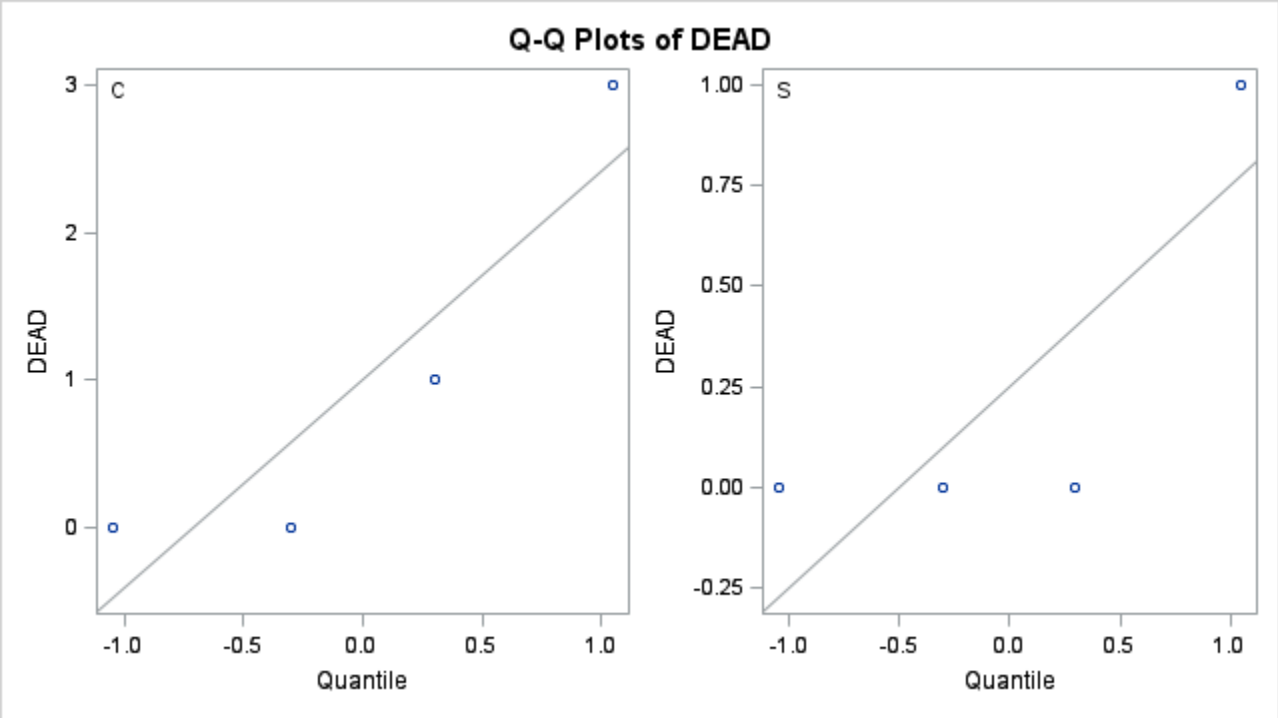
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		1.0000	-1.2503	3.2503	1.4142	0.8011	5.2730
S		0.2500	-0.5456	1.0456	0.5000	0.2832	1.8643
Diff (1-2)	**Pooled**	0.7500	-1.0852	2.5852	1.0607	0.6835	2.3356
Diff (1-2)	**Satterthwaite**	0.7500	-1.3911	2.8911			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	1.00	0.3559
Satterthwaite	Unequal	3.7385	1.00	0.3776

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	8.00	0.1215




Q-Q Plots of DEAD
C
S
DEAD
Quantile
3
2
1
0
1.00
0.75
0.50
0.25
0.00
-0.25
-1.0
-0.5
0.0
0.5
1.0

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=3

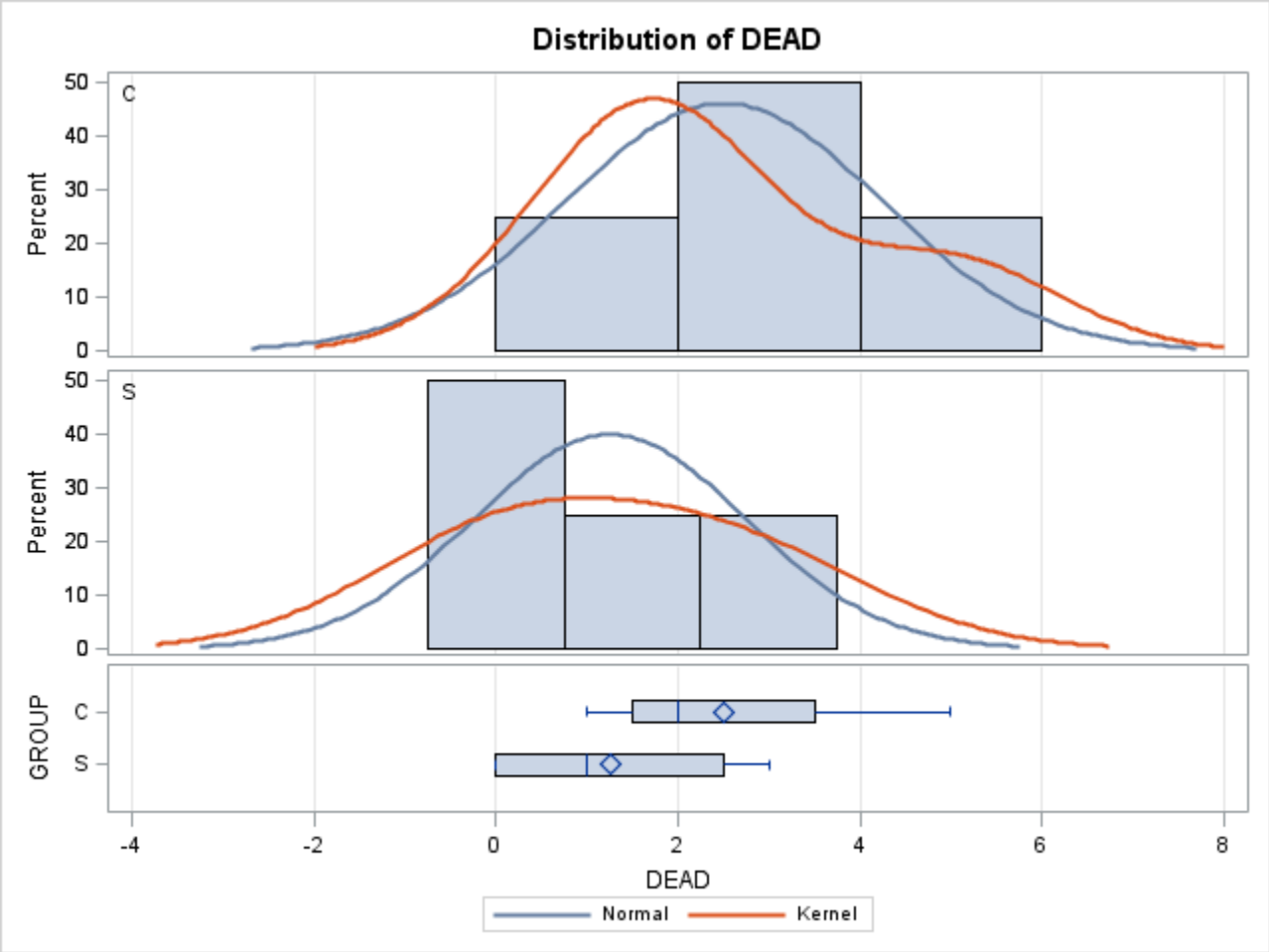
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2.5000	1.7321	0.8660	1.0000	5.0000
S	4	1.2500	1.5000	0.7500	0	3.0000
Diff (1-2)		1.2500	1.6202	1.1456		

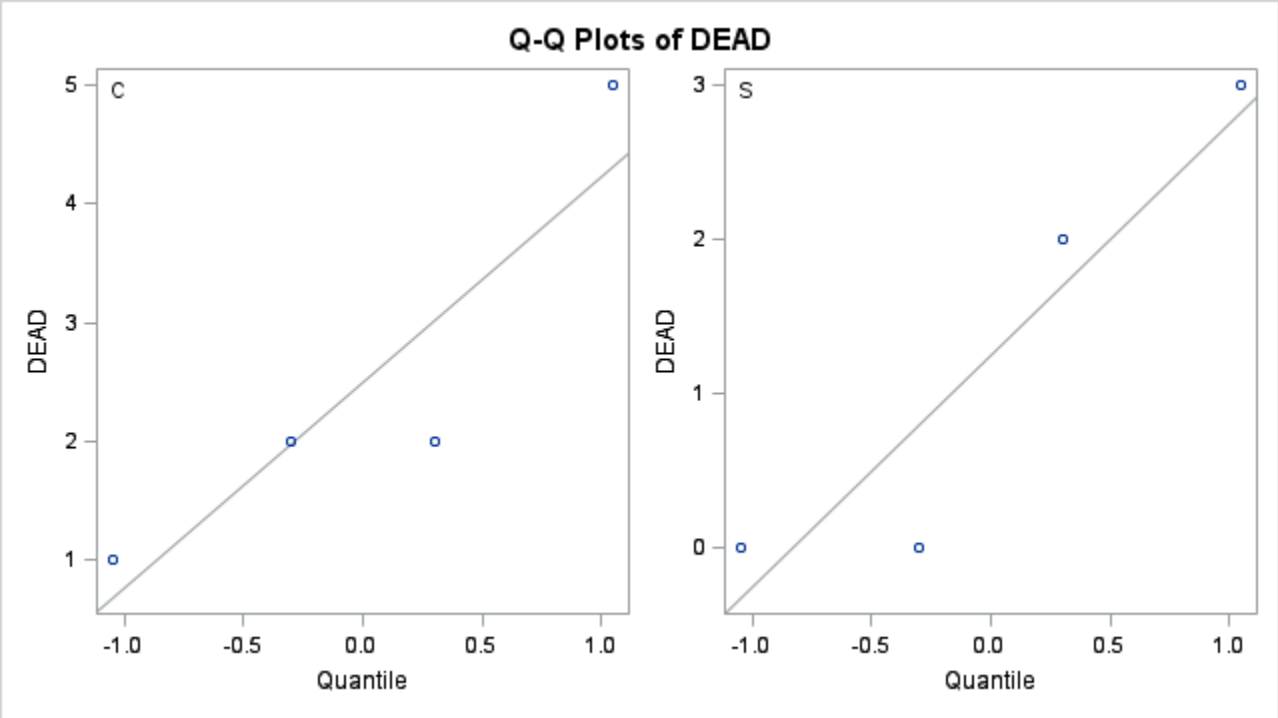
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2.5000	-0.2561	5.2561	1.7321	0.9812	6.4580
S		1.2500	-1.1368	3.6368	1.5000	0.8497	5.5928
Diff (1-2)	**Pooled**	1.2500	-1.5533	4.0533	1.6202	1.0440	3.5678
Diff (1-2)	**Satterthwaite**	1.2500	-1.5672	4.0672			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	1.09	0.3171
Satterthwaite	Unequal	5.88	1.09	0.3179

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.33	0.8187


Distribution of DEAD
C
S
Percent
50
40
30
20
10
0
GROUP
C
S
-4
-2
0
2
4
6
8
DEAD
Normal
Kernel


Q-Q Plots of DEAD
C
S
DEAD
Quantile
-1.0
-0.5
0.0
0.5
1.0
1
2
3
4
5
0

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=5

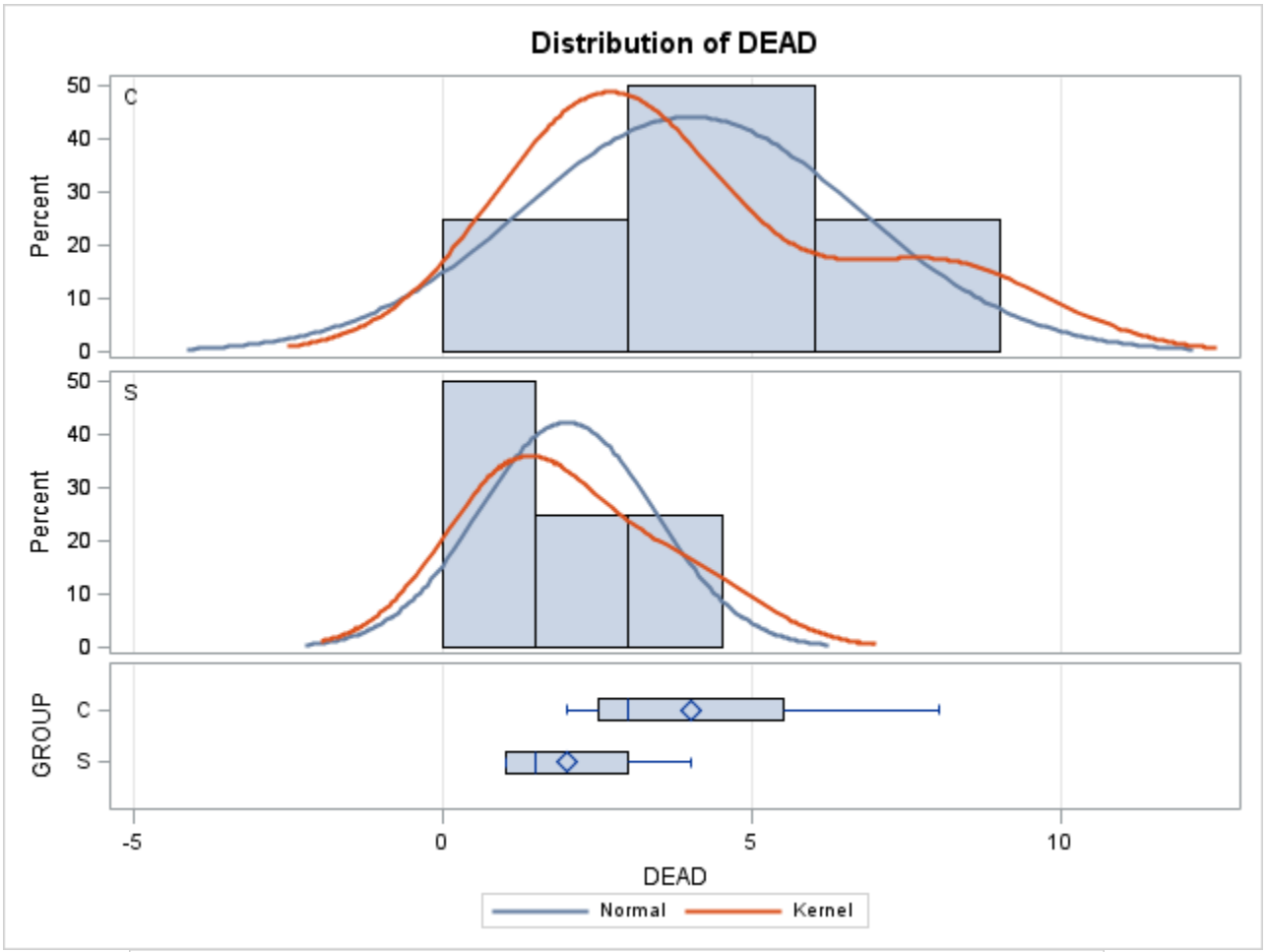
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	4.0000	2.7080	1.3540	2.0000	8.0000
S	4	2.0000	1.4142	0.7071	1.0000	4.0000
Diff (1-2)		2.0000	2.1602	1.5275		

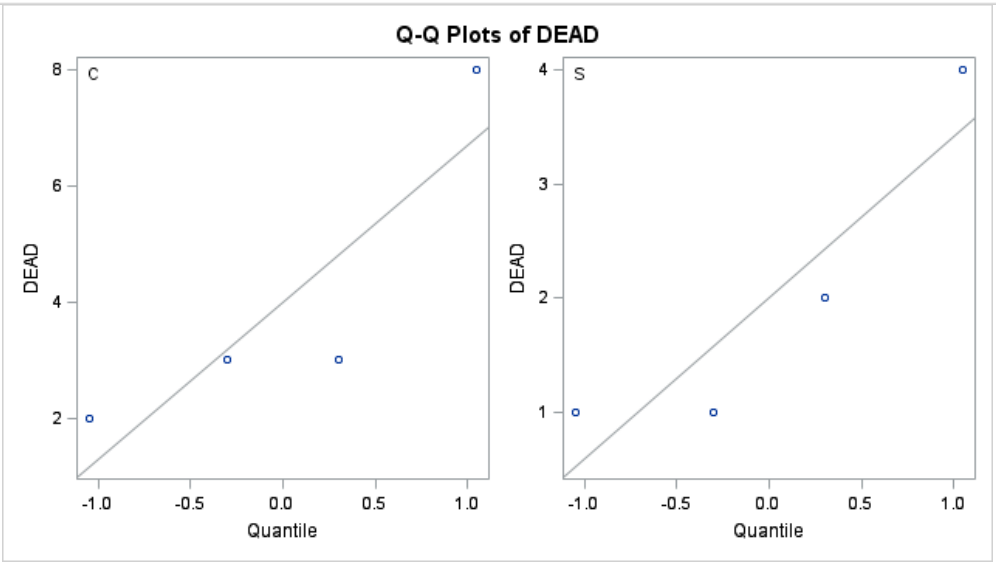
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		4.0000	-0.3091	8.3091	2.7080	1.5341	10.0970
S		2.0000	-0.2503	4.2503	1.4142	0.8011	5.2730
Diff (1-2)	**Pooled**	2.0000	-1.7377	5.7377	2.1602	1.3920	4.7570
Diff (1-2)	**Satterthwaite**	2.0000	-2.0545	6.0545			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	1.31	0.2383
Satterthwaite	Unequal	4.5231	1.31	0.2530

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	3.67	0.3142


Distribution of DEAD
C
S
Percent
GROUP
DEAD
Normal
Kernel


Q-Q Plots of DEAD
C
S
DEAD
Quantile

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=7

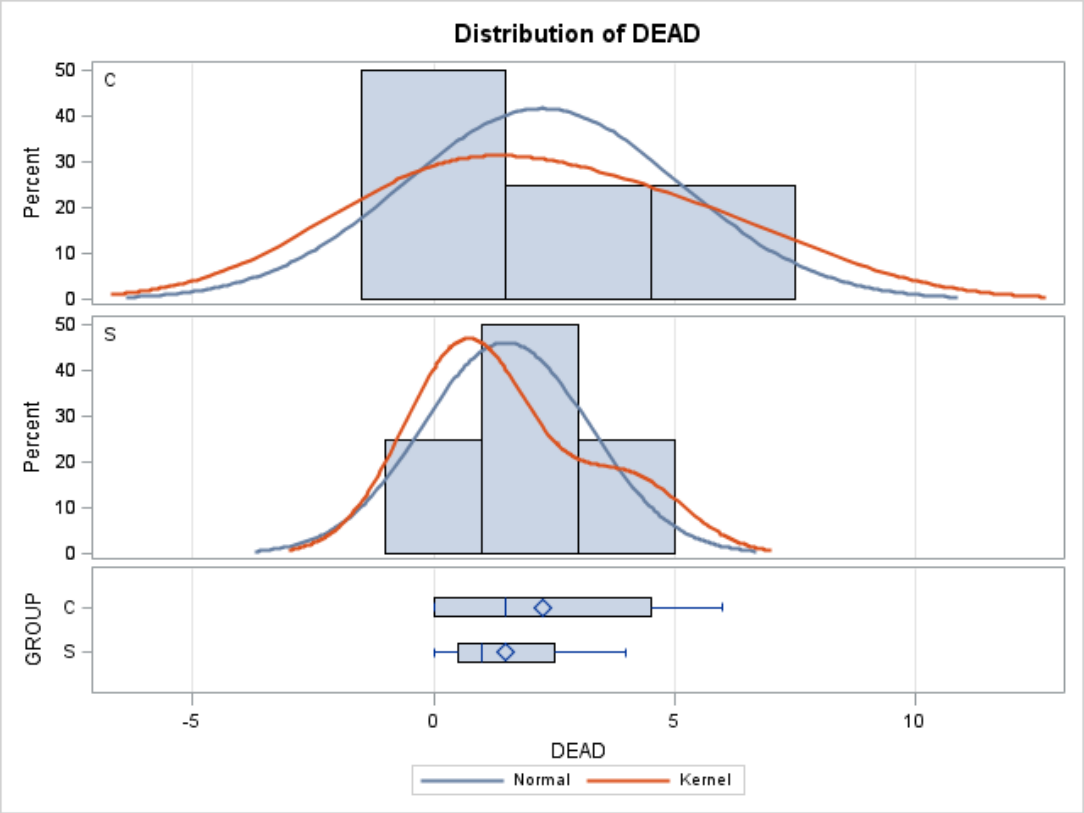
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2.2500	2.8723	1.4361	0	6.0000
S	4	1.5000	1.7321	0.8660	0	4.0000
Diff (1-2)		0.7500	2.3717	1.6771		

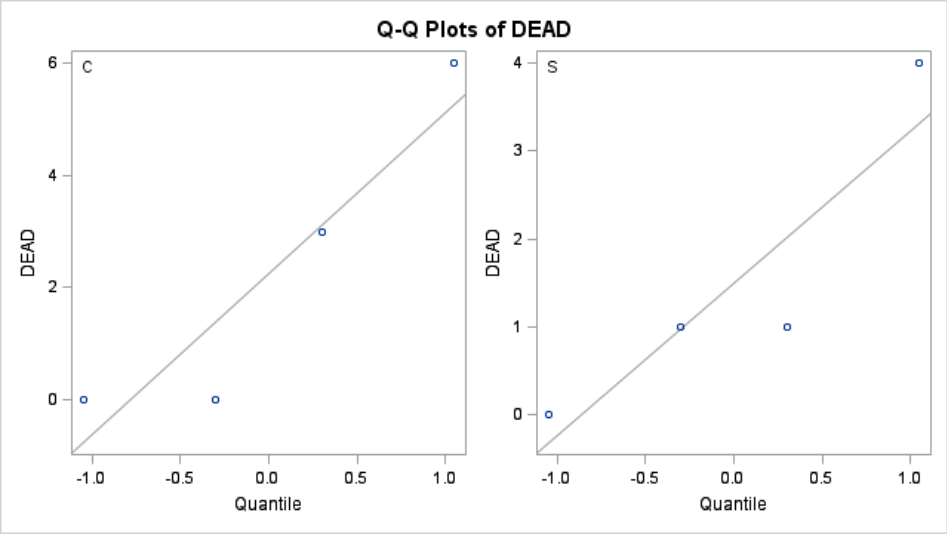
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2.2500	-2.3204	6.8204	2.8723	1.6271	10.7094
S		1.5000	-1.2561	4.2561	1.7321	0.9812	6.4580
Diff (1-2)	**Pooled**	0.7500	-3.3536	4.8536	2.3717	1.5283	5.2227
Diff (1-2)	**Satterthwaite**	0.7500	-3.5803	5.0803			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.45	0.6704
Satterthwaite	Unequal	4.927	0.45	0.6737

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.75	0.4282


Distribution of DEAD
C
S
Percent
GROUP
DEAD
Normal
Kernel


Q-Q Plots of DEAD
C
S
DEAD
Quantile

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=10

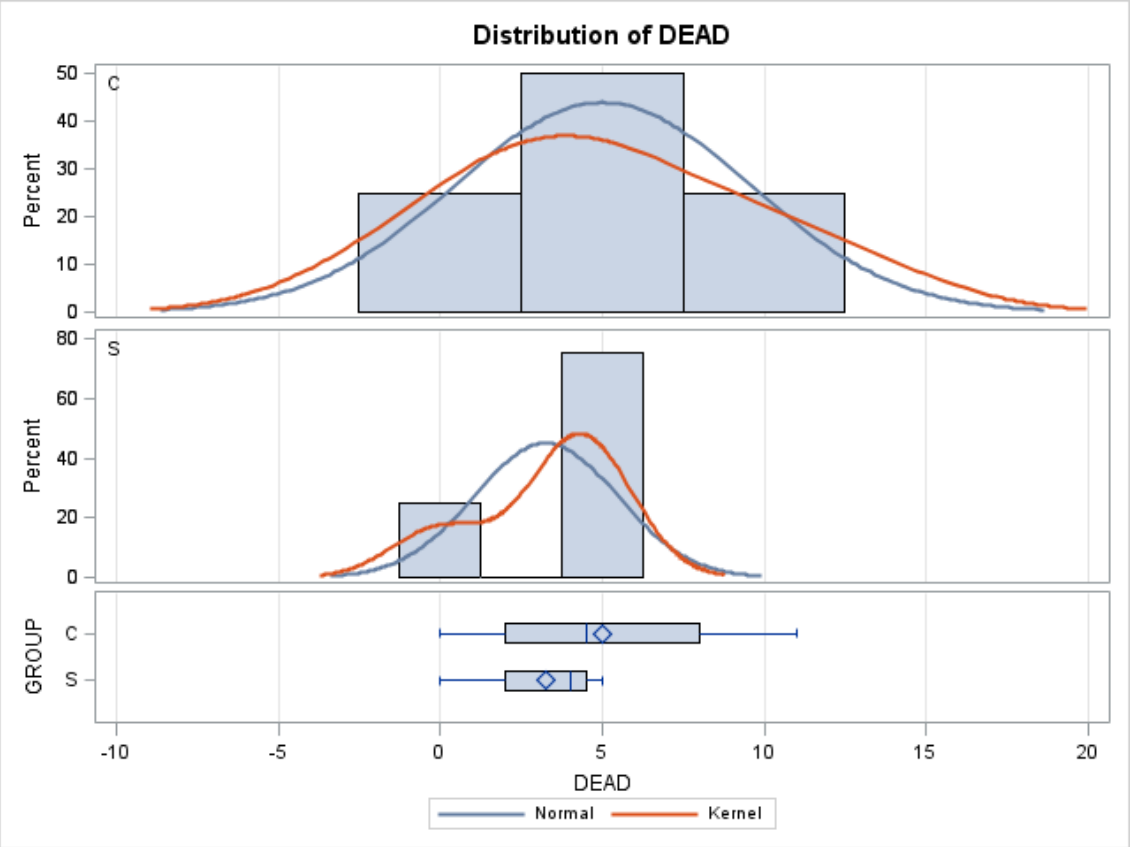
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	5.0000	4.5461	2.2730	0	11.0000
S	4	3.2500	2.2174	1.1087	0	5.0000
Diff (1-2)		1.7500	3.5765	2.5290		

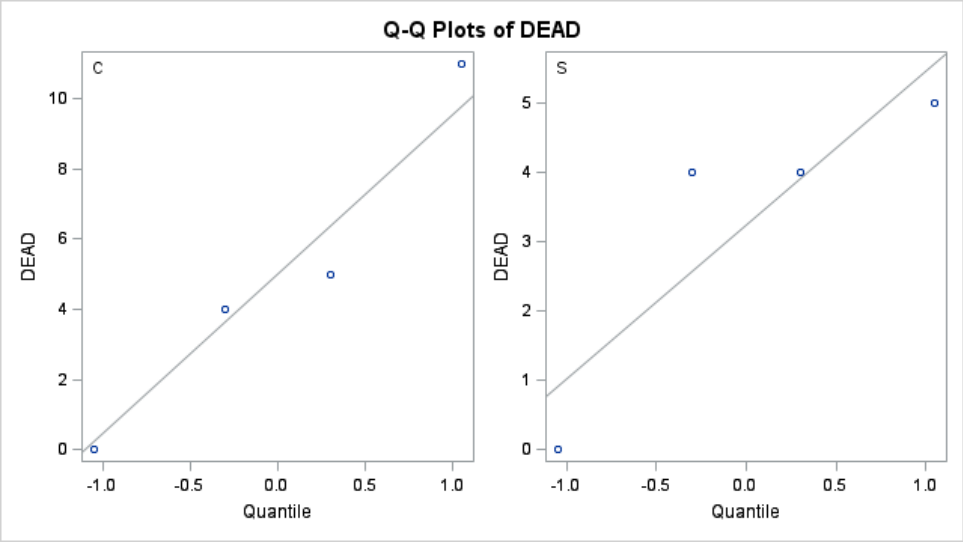
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		5.0000	-2.2338	12.2338	4.5461	2.5753	16.9502
S		3.2500	-0.2783	6.7783	2.2174	1.2561	8.2675
Diff (1-2)	**Pooled**	1.7500	-4.4382	7.9382	3.5765	2.3047	7.8758
Diff (1-2)	**Satterthwaite**	1.7500	-5.0538	8.5538			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.69	0.5148
Satterthwaite	Unequal	4.351	0.69	0.5241

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	4.20	0.2689


Distribution of DEAD
C
S
Percent
GROUP
DEAD
Normal
Kernel


Q-Q Plots of DEAD
C
S
DEAD
Quantile

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=13

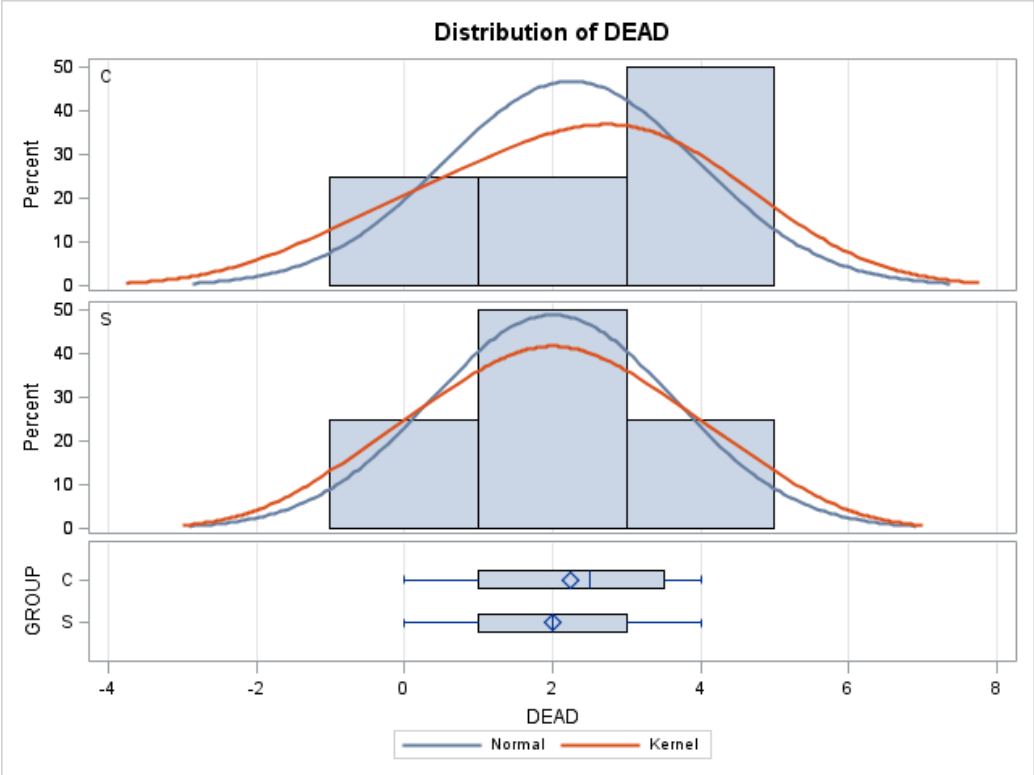
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2.2500	1.7078	0.8539	0	4.0000
S	4	2.0000	1.6330	0.8165	0	4.0000
Diff (1-2)		0.2500	1.6708	1.1815		

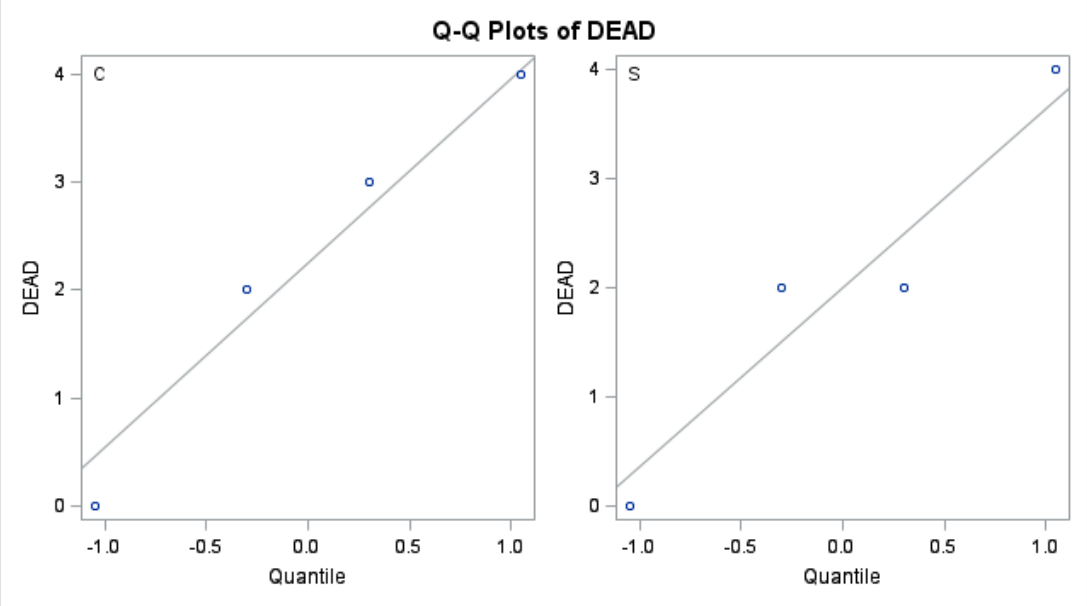
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2.2500	-0.4675	4.9675	1.7078	0.9675	6.3677
S		2.0000	-0.5985	4.5985	1.6330	0.9251	6.0887
Diff (1-2)	**Pooled**	0.2500	-2.6409	3.1409	1.6708	1.0767	3.6793
Diff (1-2)	**Satterthwaite**	0.2500	-2.6423	3.1423			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.21	0.8394
Satterthwaite	Unequal	5.988	0.21	0.8394

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.09	0.9430


Distribution of DEAD
C
S
Percent
GROUP
DEAD
Normal
Kernel


Q-Q Plots of DEAD
C
S
DEAD
Quantile

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=17

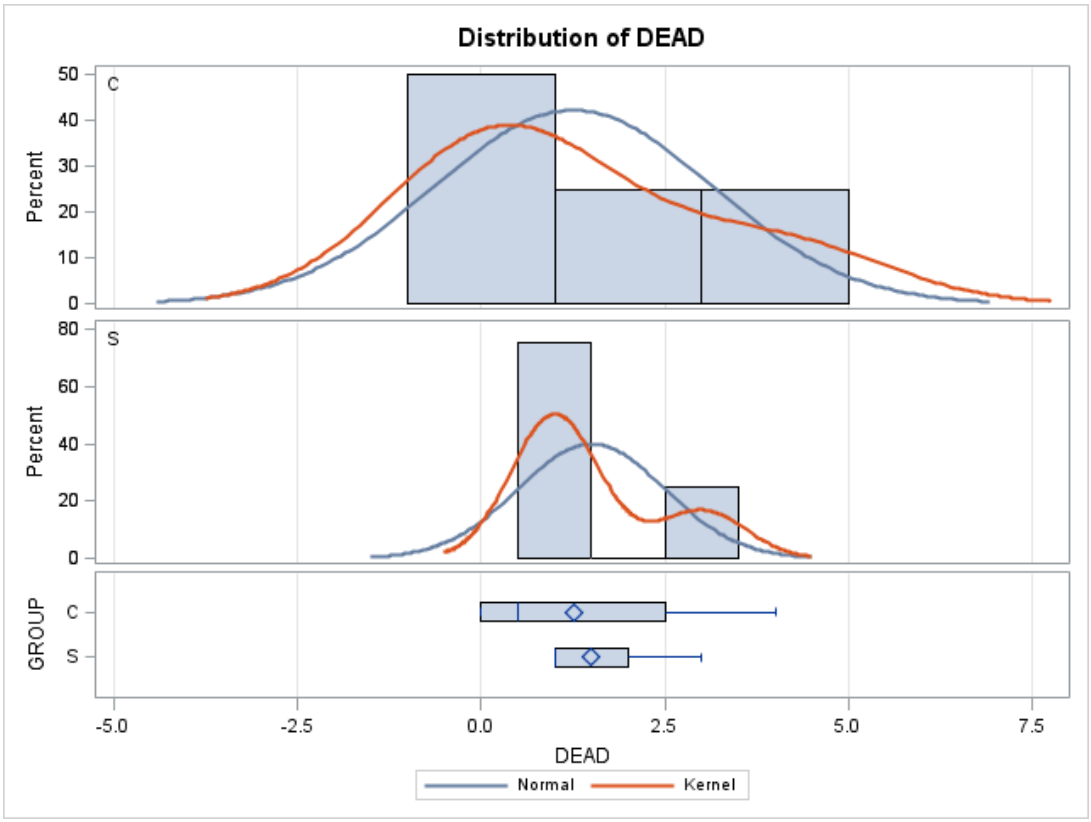
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	1.2500	1.8930	0.9465	0	4.0000
S	4	1.5000	1.0000	0.5000	1.0000	3.0000
Diff (1-2)		-0.2500	1.5138	1.0704		

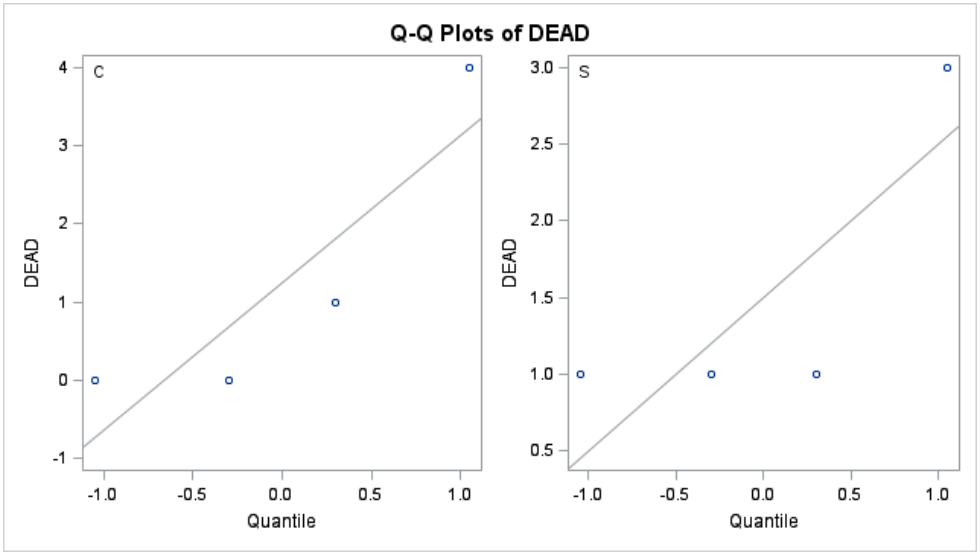
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		1.2500	-1.7621	4.2621	1.8930	1.0723	7.0580
S		1.5000	-0.0912	3.0912	1.0000	0.5665	3.7285
Diff (1-2)	**Pooled**	-0.2500	-2.8693	2.3693	1.5138	0.9755	3.3335
Diff (1-2)	**Satterthwaite**	-0.2500	-3.0848	2.5848			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.23	0.8231
Satterthwaite	Unequal	4.5534	-0.23	0.8255

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	3.58	0.3224





COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

Variable: DEAD
DAT=21

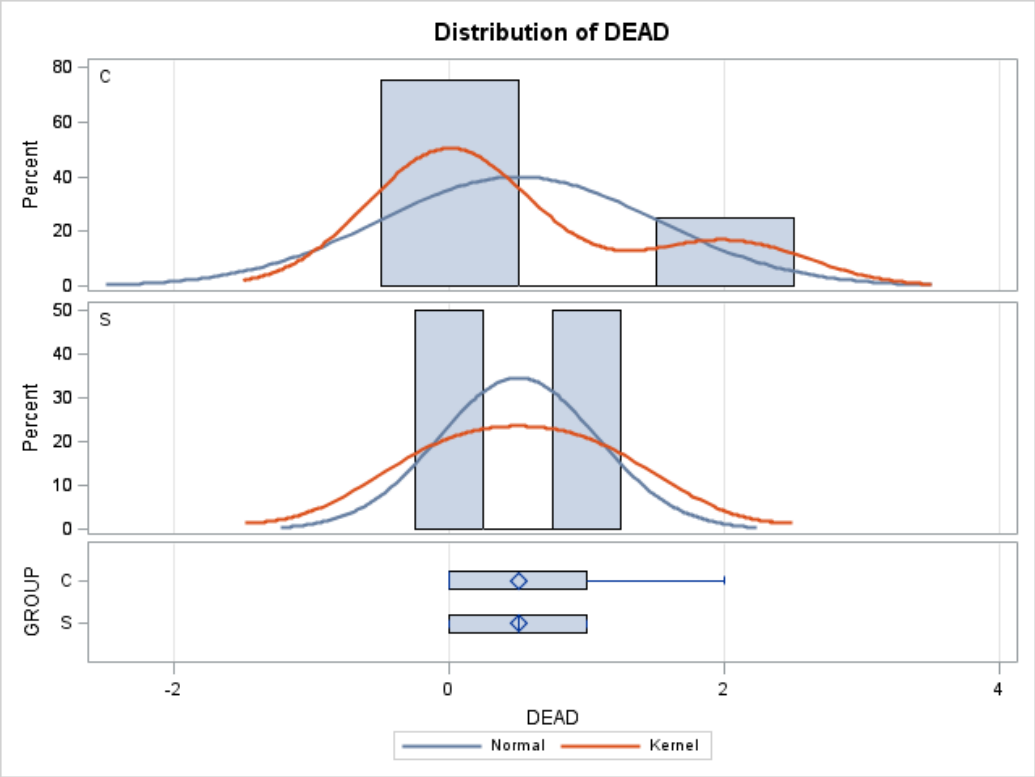
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	0.5000	1.0000	0.5000	0	2.0000
S	4	0.5000	0.5774	0.2887	0	1.0000
Diff (1-2)		0	0.8165	0.5774		

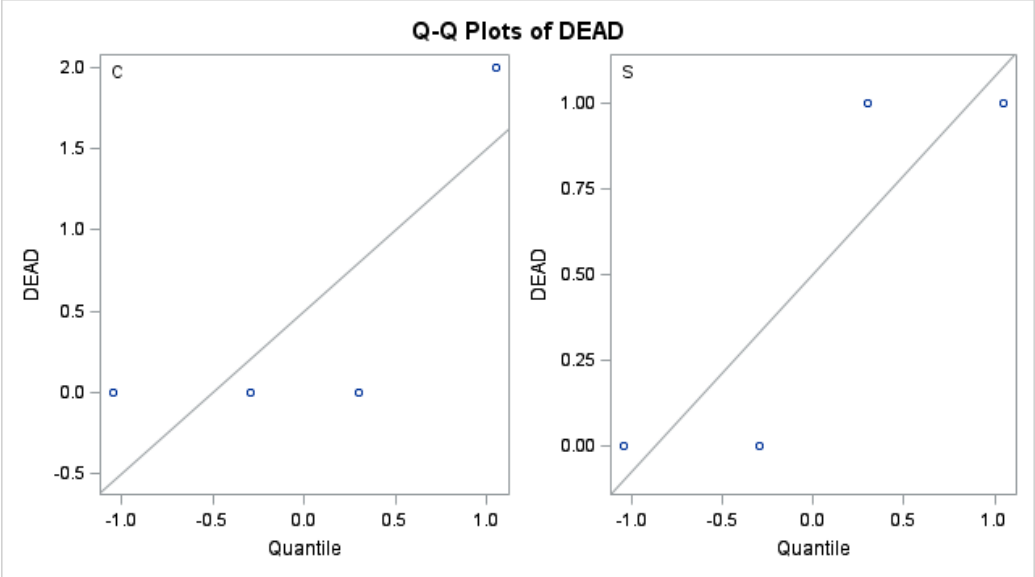
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		0.5000	-1.0912	2.0912	1.0000	0.5665	3.7285
S		0.5000	-0.4187	1.4187	0.5774	0.3271	2.1527
Diff (1-2)	**Pooled**	0	-1.4127	1.4127	0.8165	0.5261	1.7980
Diff (1-2)	**Satterthwaite**	0	-1.5029	1.5029			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.00	1.0000
Satterthwaite	Unequal	4.8	0.00	1.0000

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	3.00	0.3910


Distribution of DEAD
C
S
Percent
GROUP
DEAD
Normal
Kernel


Q-Q Plots of DEAD
C
S
DEAD
Quantile

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=24

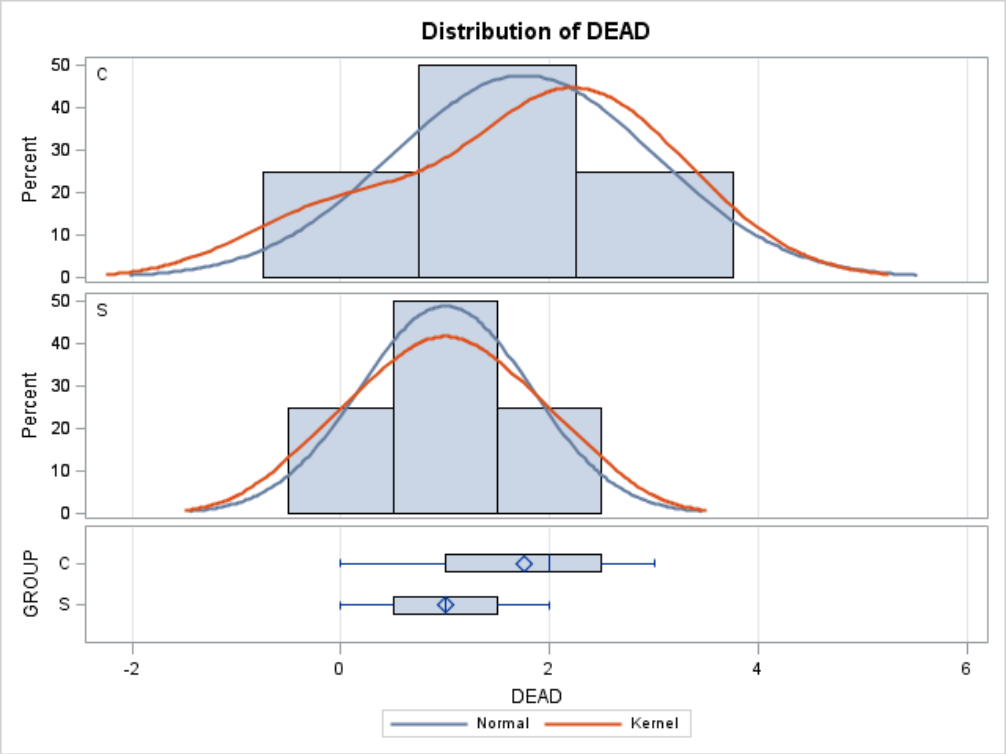
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	1.7500	1.2583	0.6292	0	3.0000
S	4	1.0000	0.8165	0.4082	0	2.0000
Diff (1-2)		0.7500	1.0607	0.7500		

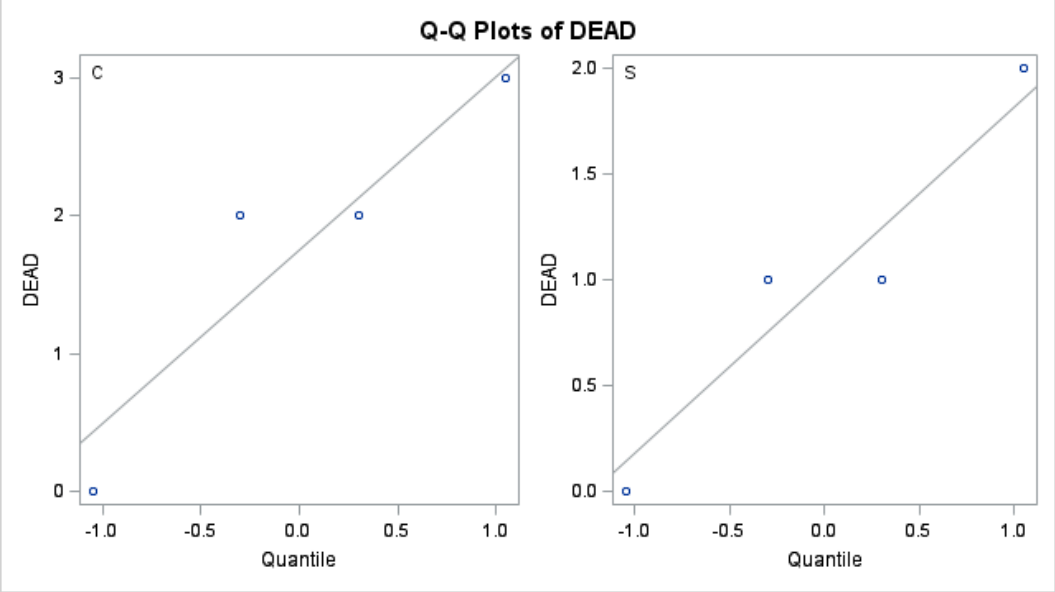
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		1.7500	-0.2522	3.7522	1.2583	0.7128	4.6917
S		1.0000	-0.2992	2.2992	0.8165	0.4625	3.0443
Diff (1-2)	**Pooled**	0.7500	-1.0852	2.5852	1.0607	0.6835	2.3356
Diff (1-2)	**Satterthwaite**	0.7500	-1.1616	2.6616			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	1.00	0.3559
Satterthwaite	Unequal	5.1459	1.00	0.3620

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.38	0.4960


Distribution of DEAD
C
S
Percent
GROUP
DEAD
Normal
Kernel


Q-Q Plots of DEAD
C
S
DEAD
Quantile

COMPARISON OF NUMBER OF DEAD BEES IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: DEAD
DAT=27

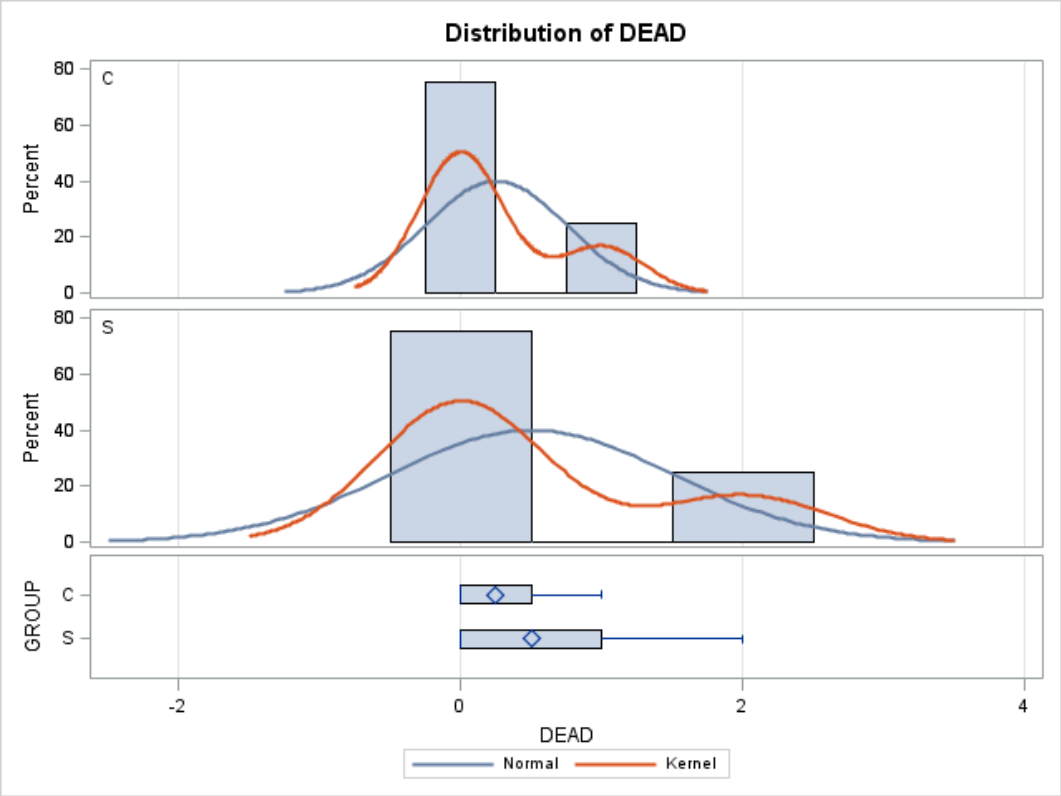
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	0.2500	0.5000	0.2500	0	1.0000
S	4	0.5000	1.0000	0.5000	0	2.0000
Diff (1-2)		-0.2500	0.7906	0.5590		

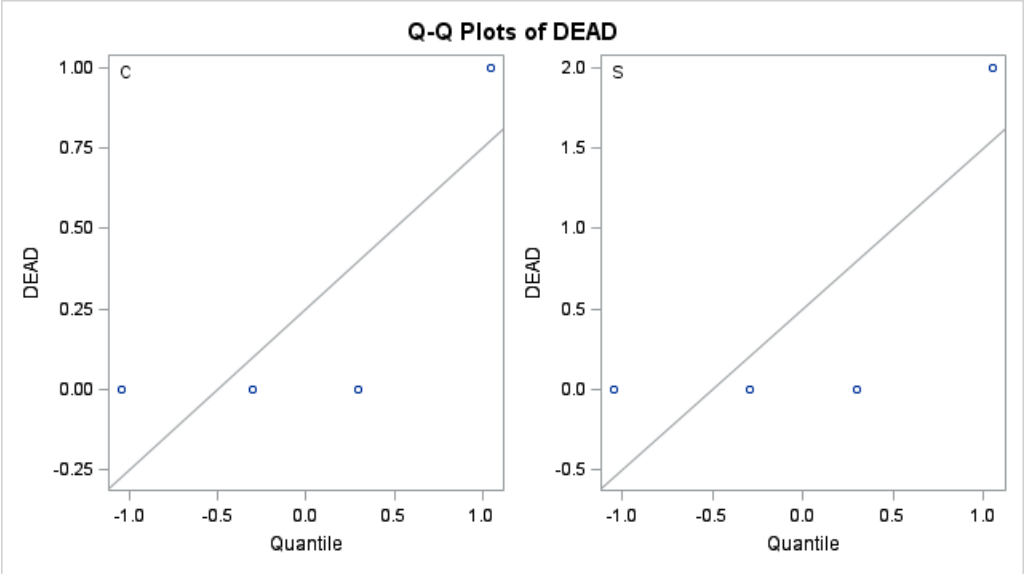
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		0.2500	-0.5456	1.0456	0.5000	0.2832	1.8643
S		0.5000	-1.0912	2.0912	1.0000	0.5665	3.7285
Diff (1-2)	**Pooled**	-0.2500	-1.6179	1.1179	0.7906	0.5094	1.7409
Diff (1-2)	**Satterthwaite**	-0.2500	-1.7466	1.2466			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.45	0.6704
Satterthwaite	Unequal	4.4118	-0.45	0.6758

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	4.00	0.2848





COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

Variable: WEIGHT
DAT=-4

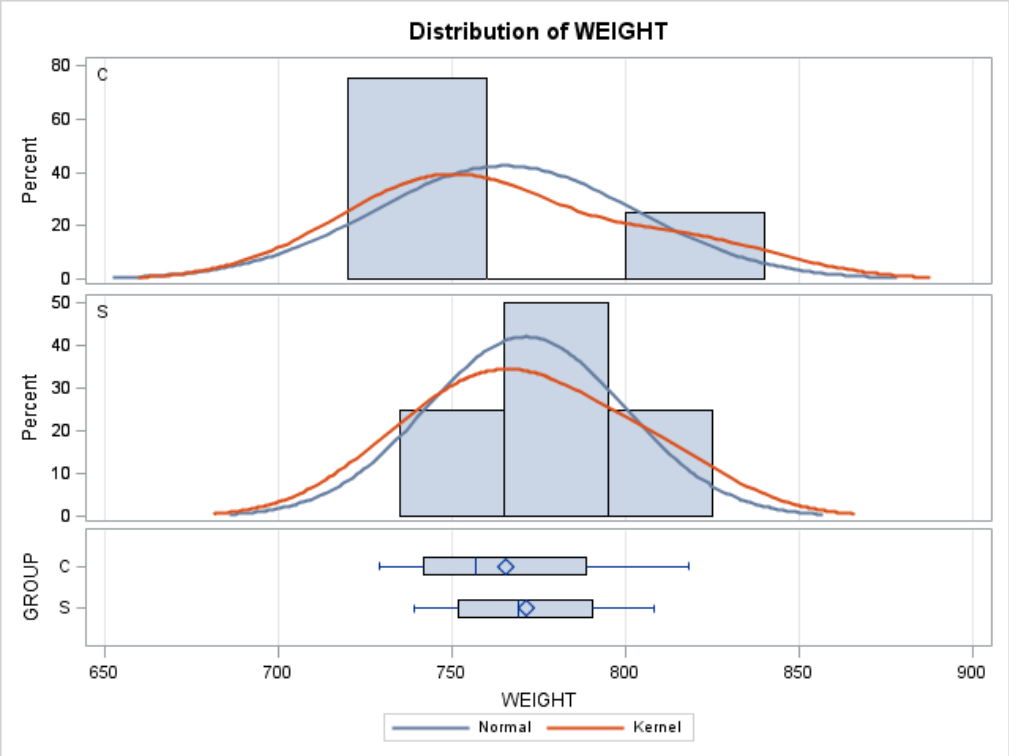
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	765.3	37.5977	18.7988	729.0	818.0
S	4	771.3	28.4766	14.2383	739.0	808.0
Diff (1-2)		-6.0000	33.3504	23.5823		

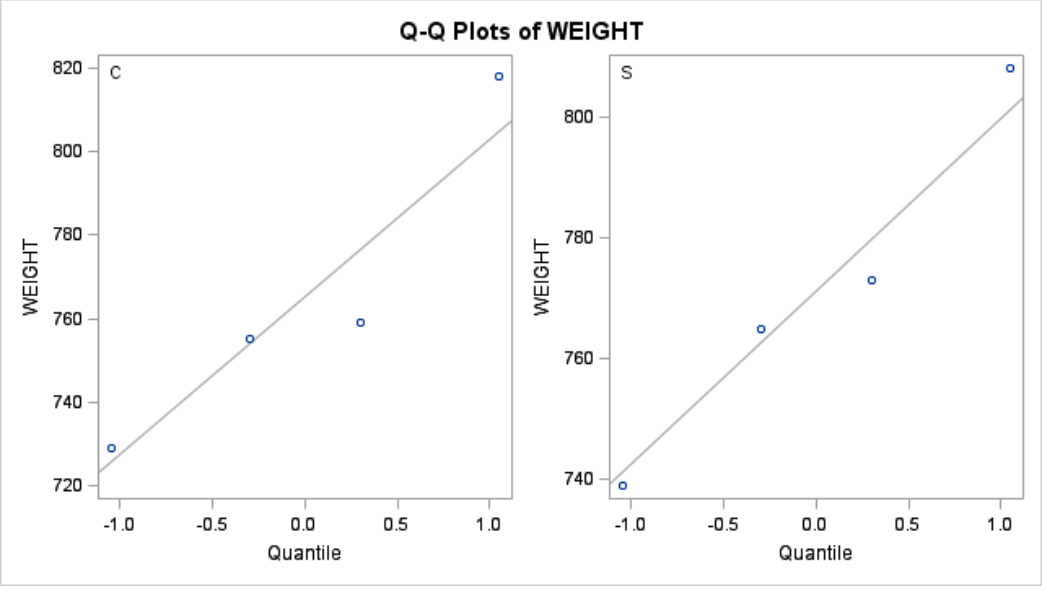
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		765.3	705.4	825.1	37.5977	21.2987	140.2
S		771.3	725.9	816.6	28.4766	16.1317	106.2
Diff (1-2)	**Pooled**	-6.0000	-63.7038	51.7038	33.3504	21.4908	73.4398
Diff (1-2)	**Satterthwaite**	-6.0000	-64.7462	52.7462			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.25	0.8077
Satterthwaite	Unequal	5.5897	-0.25	0.8083

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.74	0.6593


Distribution of WEIGHT
C
S
Percent
GROUP
WEIGHT
Normal
Kernel


Q-Q Plots of WEIGHT
C
S
WEIGHT
Quantile

COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=-2

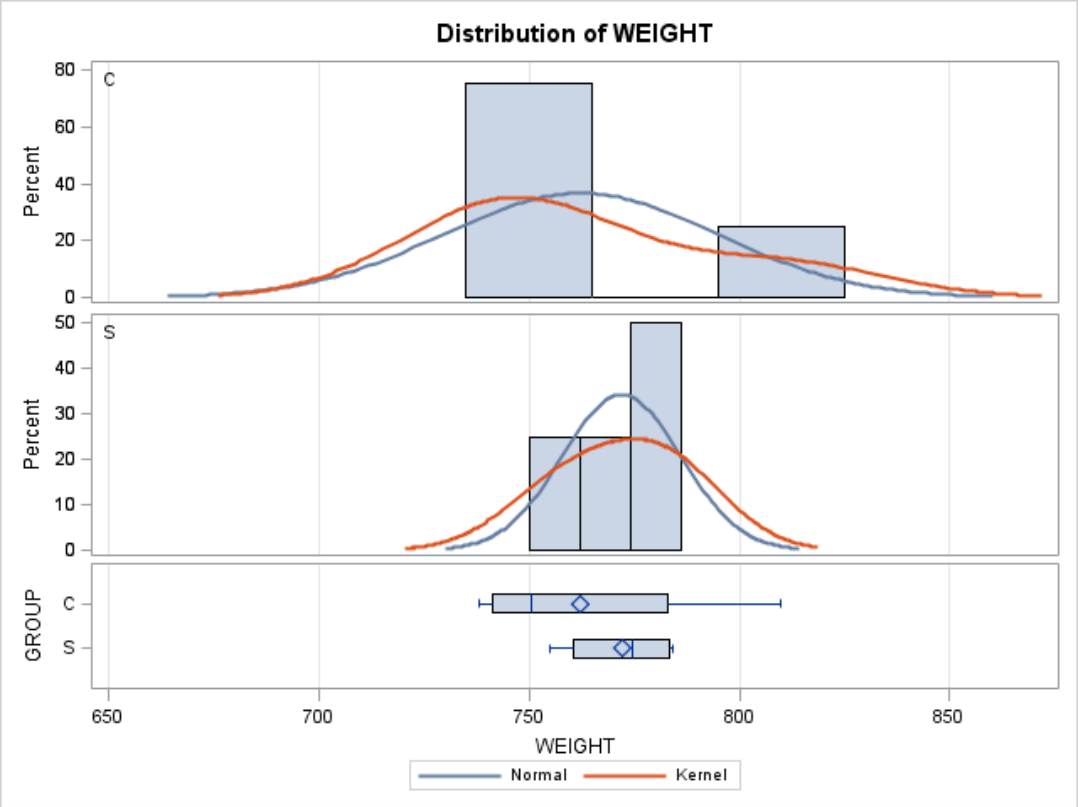
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	762.3	32.6841	16.3420	738.0	810.0
S	4	772.0	14.0238	7.0119	755.0	784.0
Diff (1-2)		-9.7500	25.1487	17.7828		

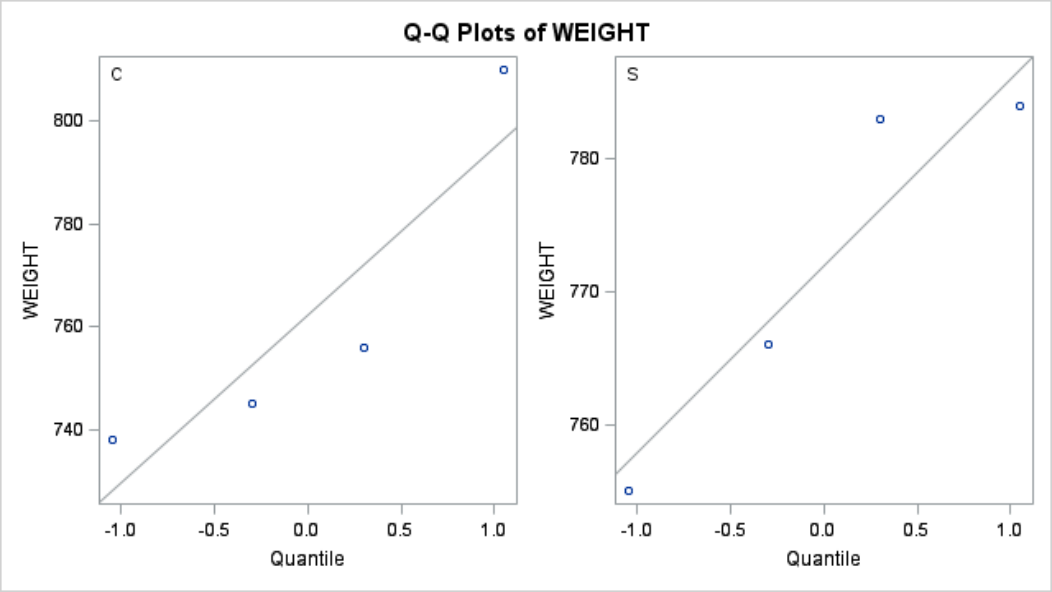
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		762.3	710.2	814.3	32.6841	18.5152	121.9
S		772.0	749.7	794.3	14.0238	7.9443	52.2884
Diff (1-2)	**Pooled**	-9.7500	-53.2630	33.7630	25.1487	16.2057	55.3792
Diff (1-2)	**Satterthwaite**	-9.7500	-58.7974	39.2974			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.55	0.6033
Satterthwaite	Unequal	4.0684	-0.55	0.6122

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	5.43	0.1982





COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=-1

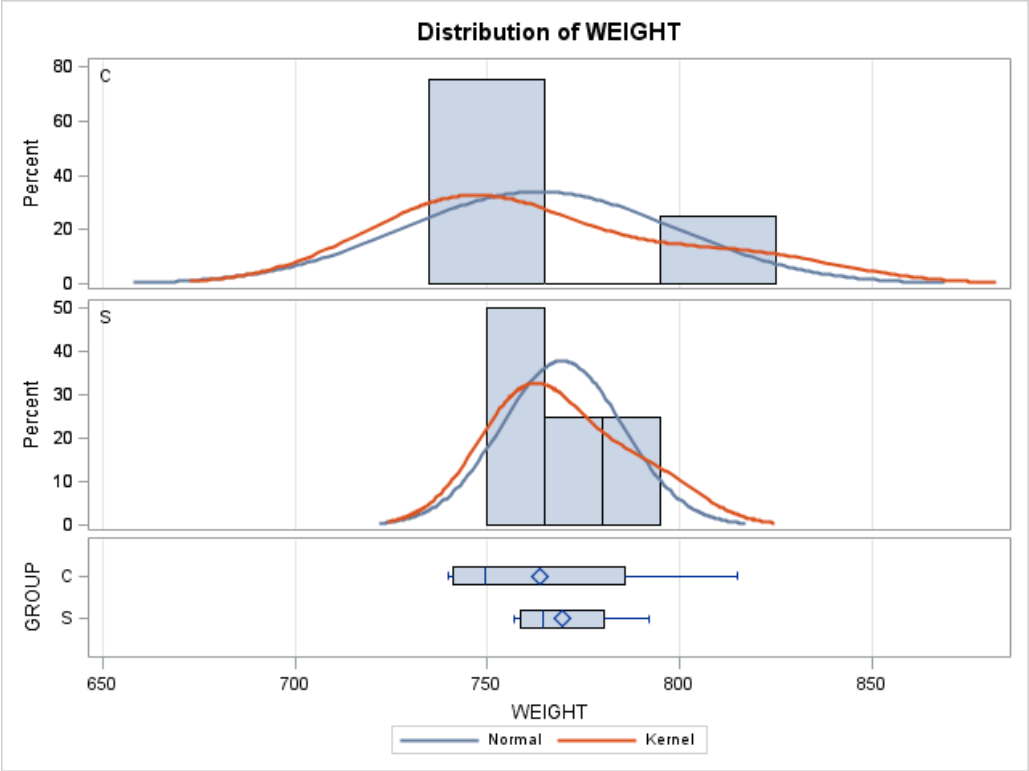
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	763.5	35.1615	17.5808	740.0	815.0
S	4	769.5	15.8430	7.9215	757.0	792.0
Diff (1-2)		-6.0000	27.2703	19.2830		

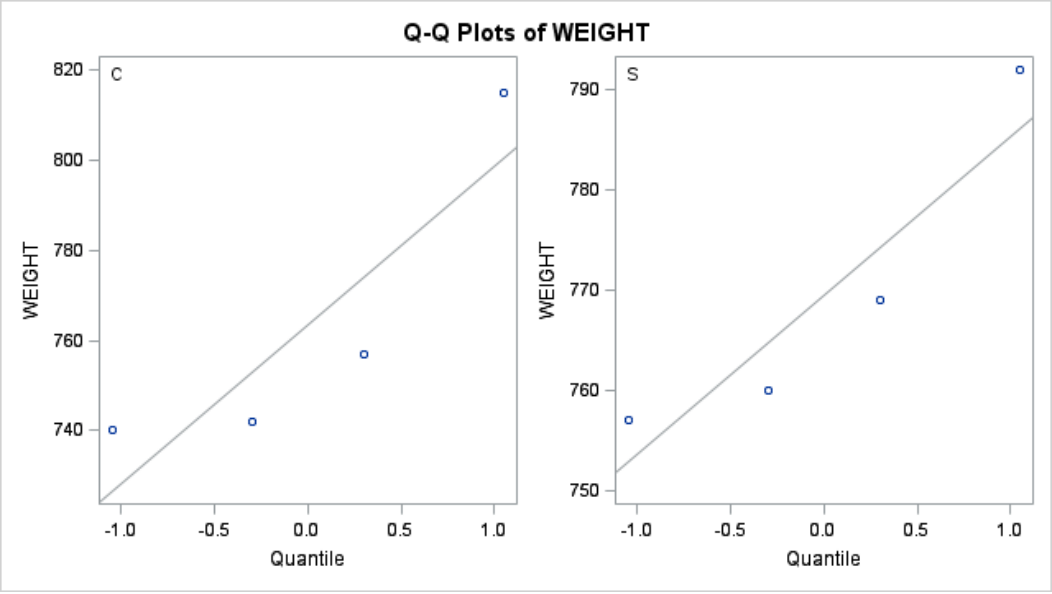
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		763.5	707.6	819.4	35.1615	19.9186	131.1
S		769.5	744.3	794.7	15.8430	8.9749	59.0713
Diff (1-2)	**Pooled**	-6.0000	-53.1838	41.1838	27.2703	17.5728	60.0509
Diff (1-2)	**Satterthwaite**	-6.0000	-58.6887	46.6887			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.31	0.7662
Satterthwaite	Unequal	4.1699	-0.31	0.7706

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	4.93	0.2231





COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=1

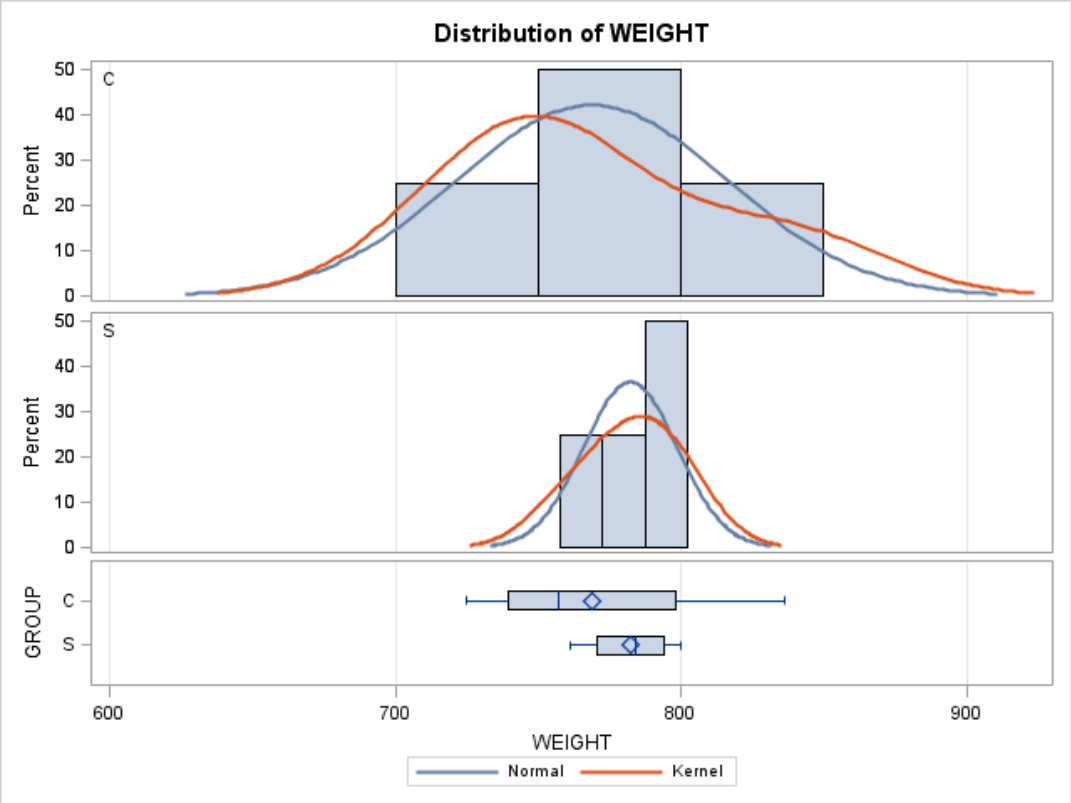
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	768.8	47.3665	23.6832	725.0	836.0
S	4	782.3	16.3783	8.1892	761.0	800.0
Diff (1-2)		-13.5000	35.4389	25.0591		

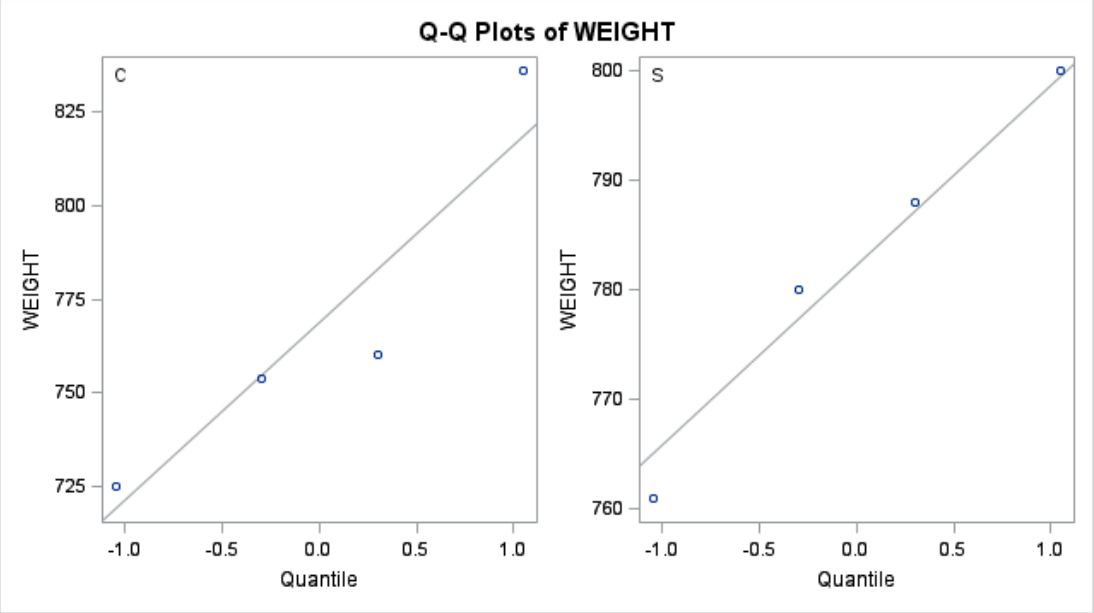
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		768.8	693.4	844.1	47.3665	26.8326	176.6
S		782.3	756.2	808.3	16.3783	9.2782	61.0674
Diff (1-2)	**Pooled**	-13.5000	-74.8174	47.8174	35.4389	22.8366	78.0388
Diff (1-2)	**Satterthwaite**	-13.5000	-85.2963	58.2963			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.54	0.6095
Satterthwaite	Unequal	3.7073	-0.54	0.6208

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	8.36	0.1146


Distribution of WEIGHT
C
S
Percent
GROUP
WEIGHT
Normal
Kernel


Q-Q Plots of WEIGHT
C
S
WEIGHT
Quantile

COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=3

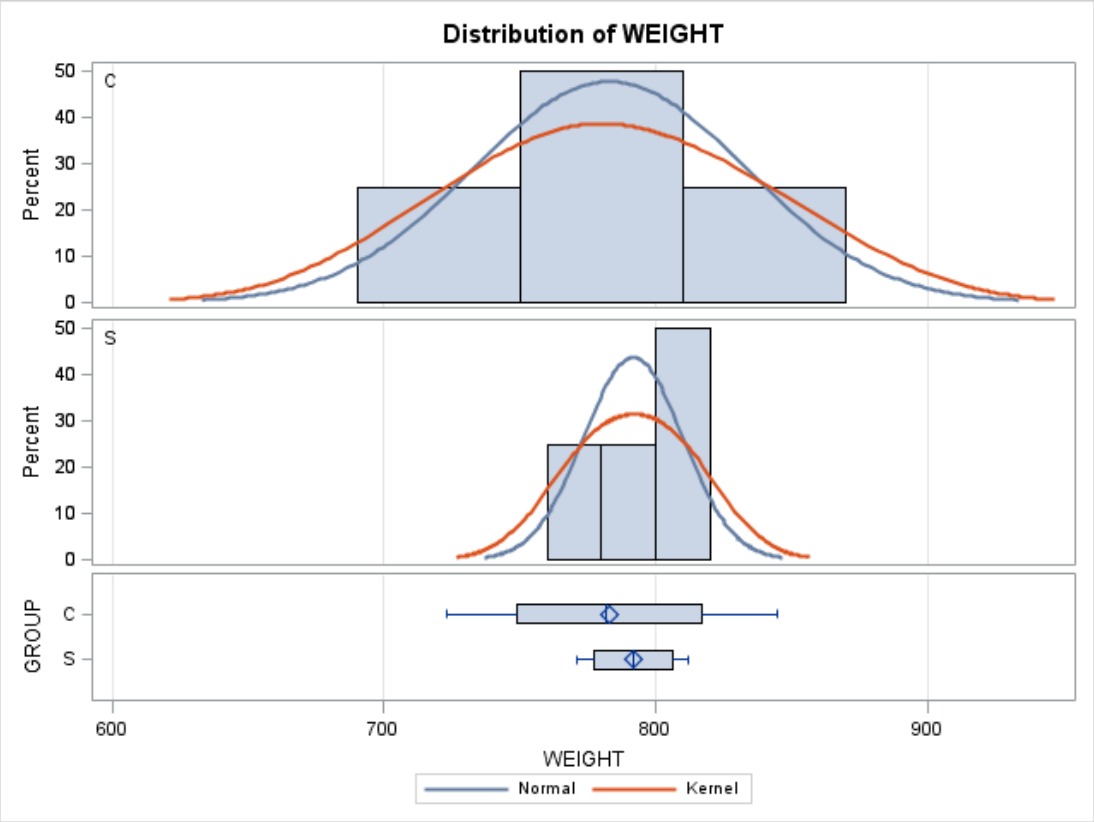
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	783.0	50.1465	25.0732	723.0	845.0
S	4	791.8	18.2825	9.1413	771.0	812.0
Diff (1-2)		-8.7500	37.7420	26.6876		

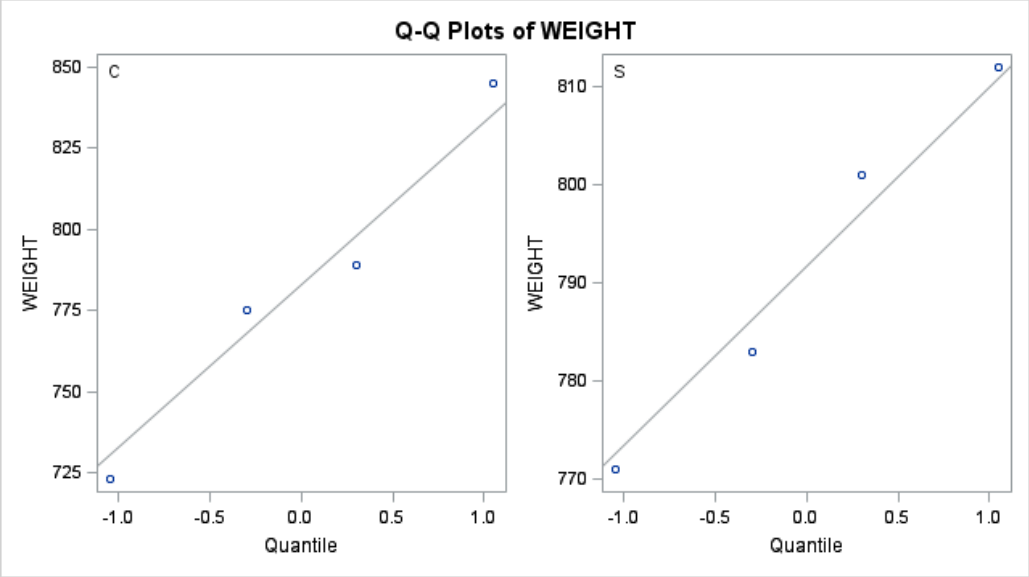
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		783.0	703.2	862.8	50.1465	28.4074	187.0
S		791.8	762.7	820.8	18.2825	10.3568	68.1672
Diff (1-2)	**Pooled**	-8.7500	-74.0523	56.5523	37.7420	24.3207	83.1104
Diff (1-2)	**Satterthwaite**	-8.7500	-84.5477	67.0477			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.33	0.7542
Satterthwaite	Unequal	3.7837	-0.33	0.7603

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	7.52	0.1315


Distribution of WEIGHT
C
S
Percent
GROUP
WEIGHT
Normal
Kernel


Q-Q Plots of WEIGHT
C
S
WEIGHT
Quantile

COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=5

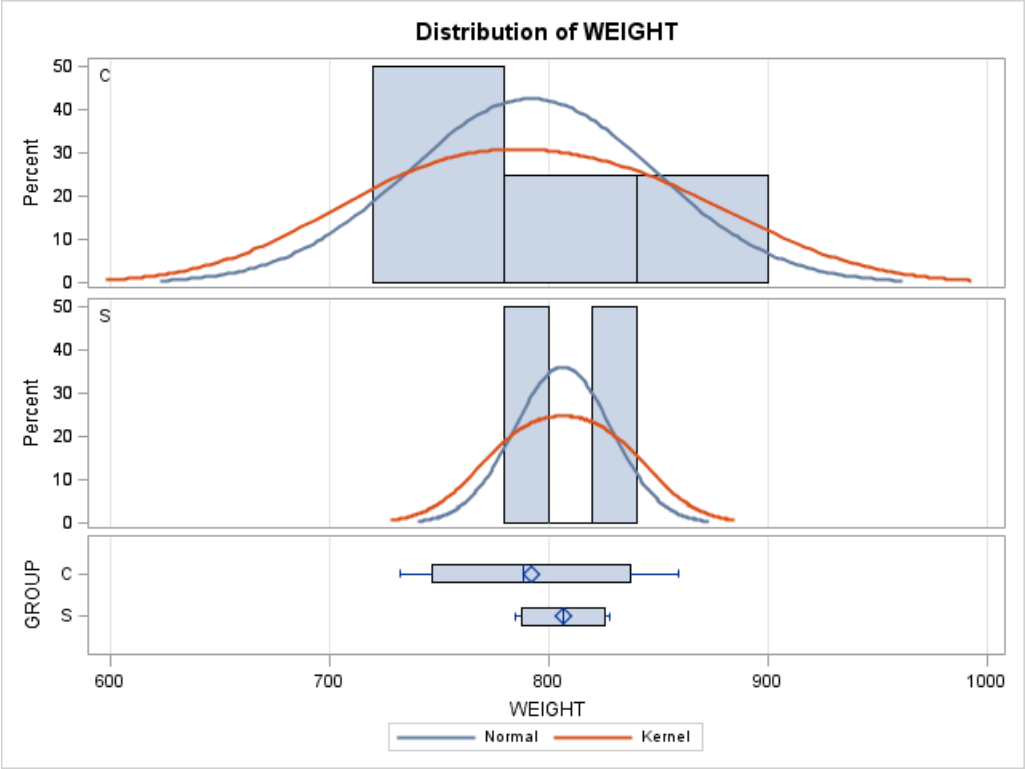
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	792.0	56.3264	28.1632	732.0	859.0
S	4	806.5	22.1284	11.0642	785.0	828.0
Diff (1-2)		-14.5000	42.7921	30.2586		

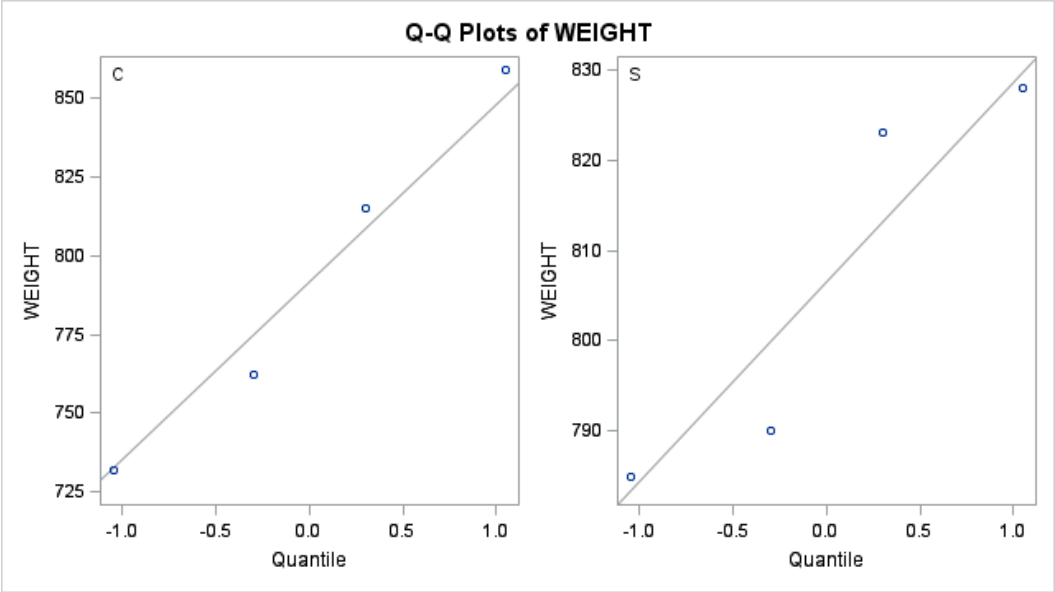
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		792.0	702.4	881.6	56.3264	31.9083	210.0
S		806.5	771.3	841.7	22.1284	12.5355	82.5068
Diff (1-2)	**Pooled**	-14.5000	-88.5401	59.5401	42.7921	27.5750	94.2311
Diff (1-2)	**Satterthwaite**	-14.5000	-99.3281	70.3281			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.48	0.6488
Satterthwaite	Unequal	3.9045	-0.48	0.6574

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	6.48	0.1592


Distribution of WEIGHT
C
S
Percent
GROUP
WEIGHT
600
700
800
900
1000
Normal
Kernel


Q-Q Plots of WEIGHT
C
S
WEIGHT
Quantile
-1.0
-0.5
0.0
0.5
1.0

COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=7

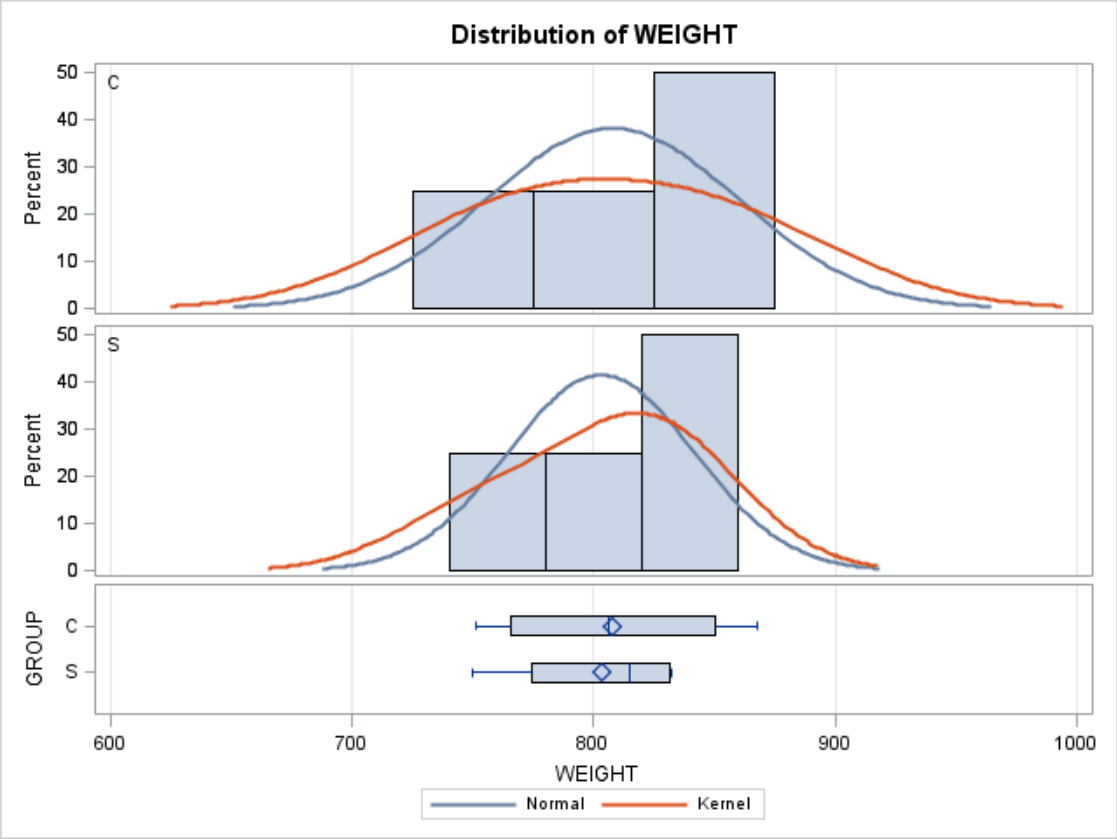
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	807.8	52.3092	26.1546	751.0	868.0
S	4	803.0	38.5141	19.2570	750.0	832.0
Diff (1-2)		4.7500	45.9325	32.4792		

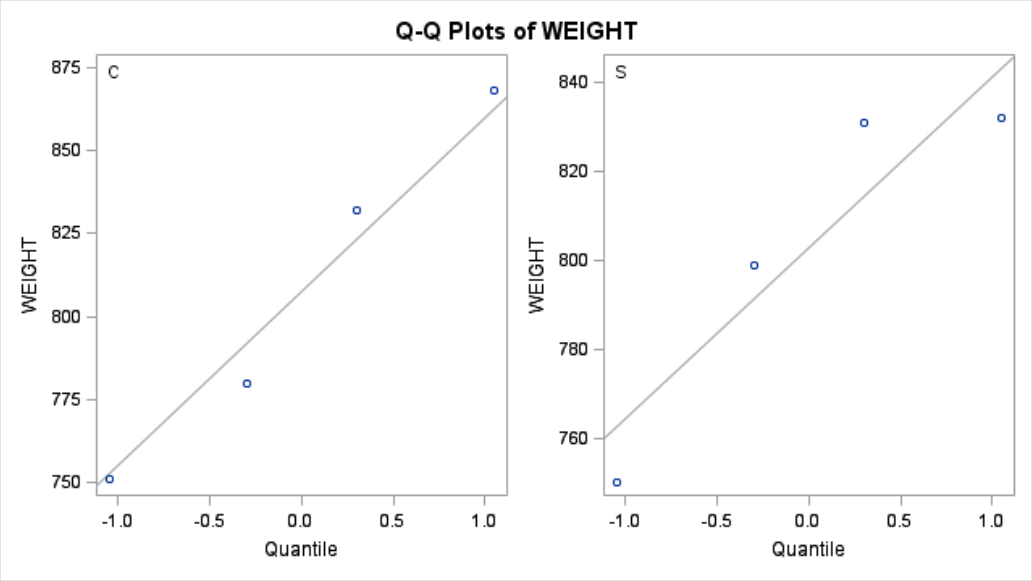
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		807.8	724.5	891.0	52.3092	29.6326	195.0
S		803.0	741.7	864.3	38.5141	21.8178	143.6
Diff (1-2)	**Pooled**	4.7500	-74.7236	84.2236	45.9325	29.5986	101.1
Diff (1-2)	**Satterthwaite**	4.7500	-76.4534	85.9534			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.15	0.8885
Satterthwaite	Unequal	5.5139	0.15	0.8889

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.84	0.6276


Distribution of WEIGHT
C
S
Percent
GROUP
WEIGHT
600
700
800
900
1000
Normal
Kernel


Q-Q Plots of WEIGHT
C
S
WEIGHT
Quantile
-1.0
-0.5
0.0
0.5
1.0

COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=10

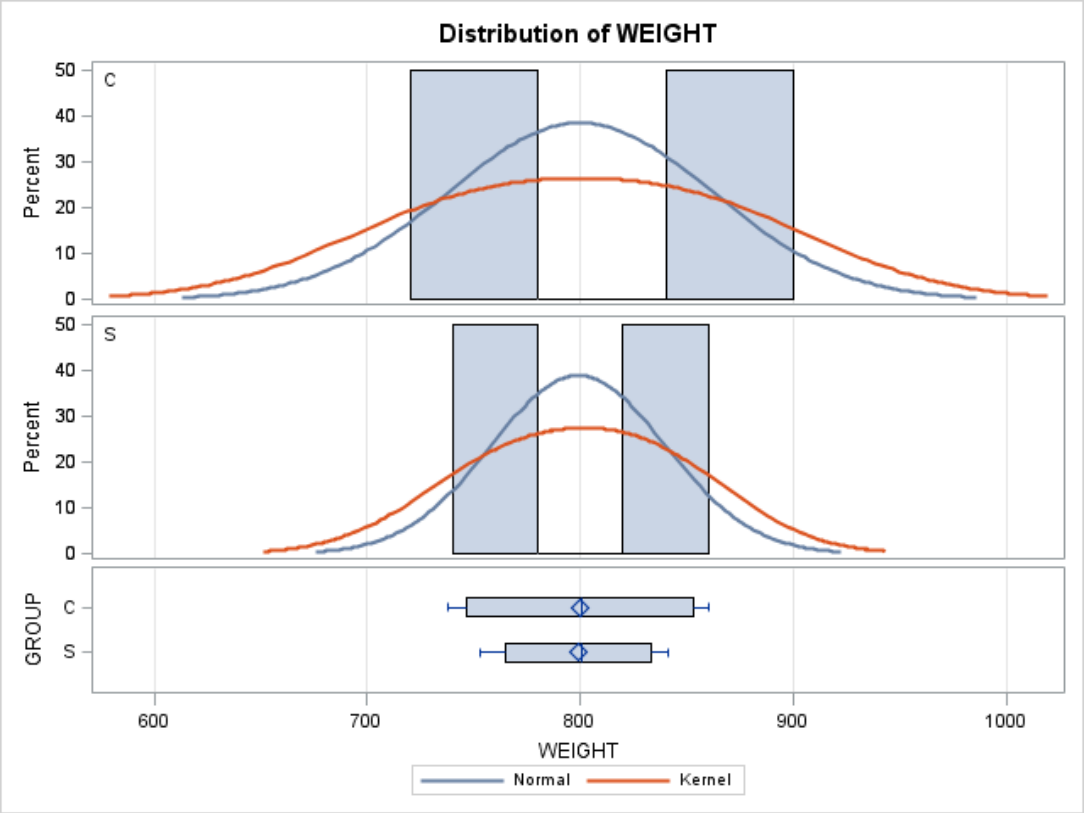
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	799.8	62.1416	31.0708	738.0	860.0
S	4	799.0	40.9878	20.4939	753.0	841.0
Diff (1-2)		0.7500	52.6383	37.2209		

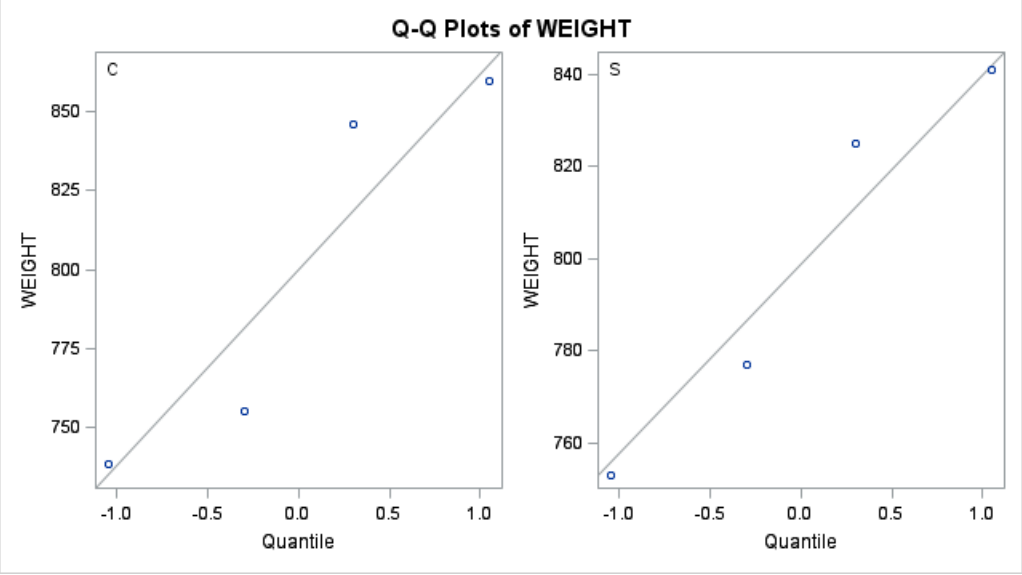
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		799.8	700.9	898.6	62.1416	35.2026	231.7
S		799.0	733.8	864.2	40.9878	23.2192	152.8
Diff (1-2)	**Pooled**	0.7500	-90.3263	91.8263	52.6383	33.9198	115.9
Diff (1-2)	**Satterthwaite**	0.7500	-93.8597	95.3597			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.02	0.9846
Satterthwaite	Unequal	5.1949	0.02	0.9847

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.30	0.5120





COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=13

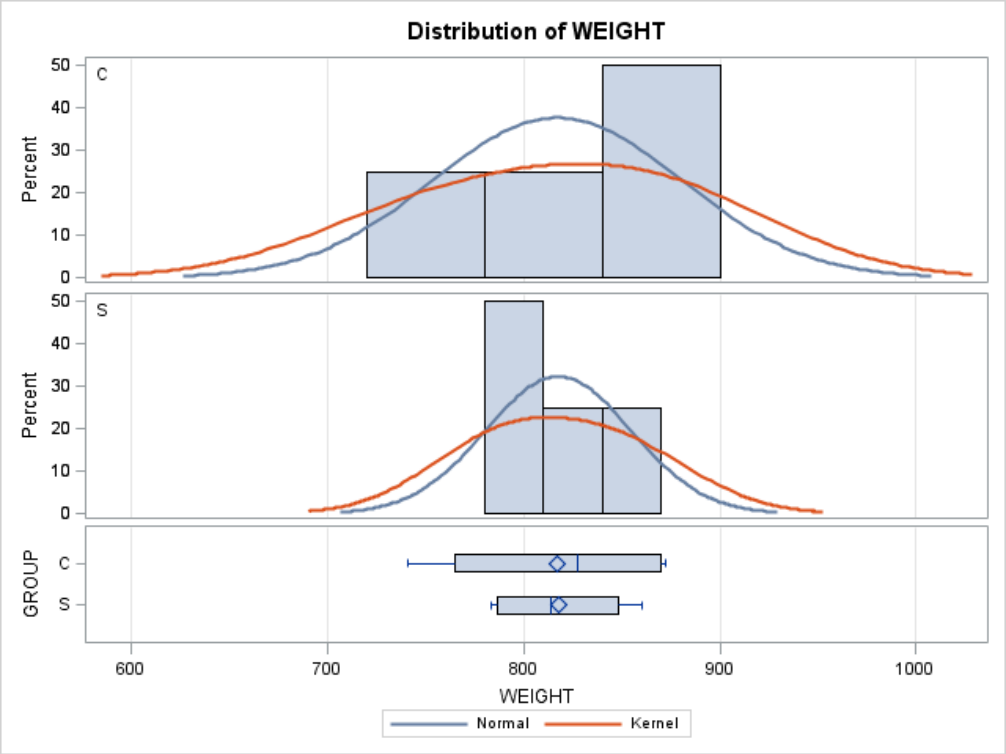
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	817.0	63.6187	31.8093	741.0	872.0
S	4	817.5	37.1169	18.5585	783.0	860.0
Diff (1-2)		-0.5000	52.0817	36.8273		

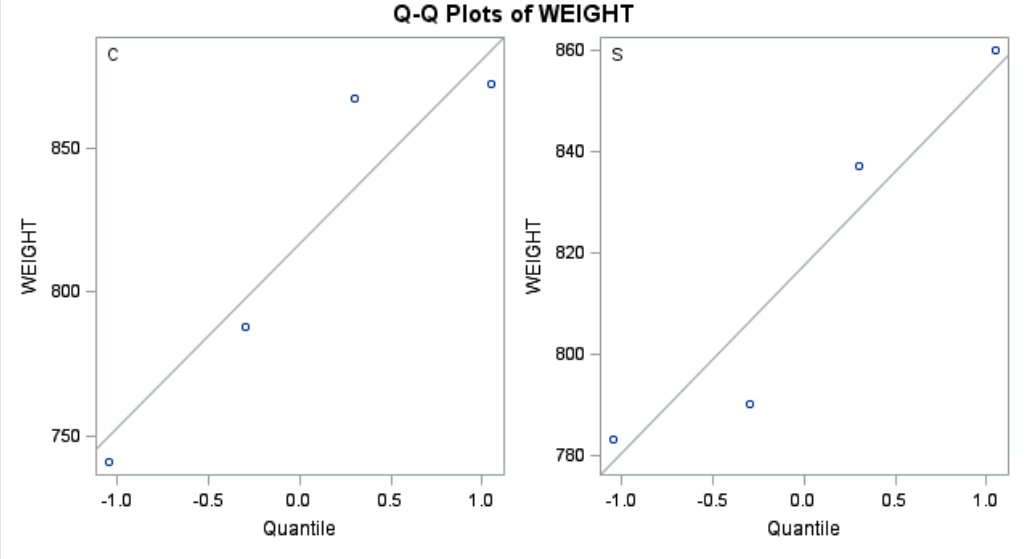
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		817.0	715.8	918.2	63.6187	36.0393	237.2
S		817.5	758.4	876.6	37.1169	21.0264	138.4
Diff (1-2)	**Pooled**	-0.5000	-90.6132	89.6132	52.0817	33.5611	114.7
Diff (1-2)	**Satterthwaite**	-0.5000	-96.1769	95.1769			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.01	0.9896
Satterthwaite	Unequal	4.8303	-0.01	0.9897

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.94	0.3997





COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

Variable: WEIGHT
DAT=17

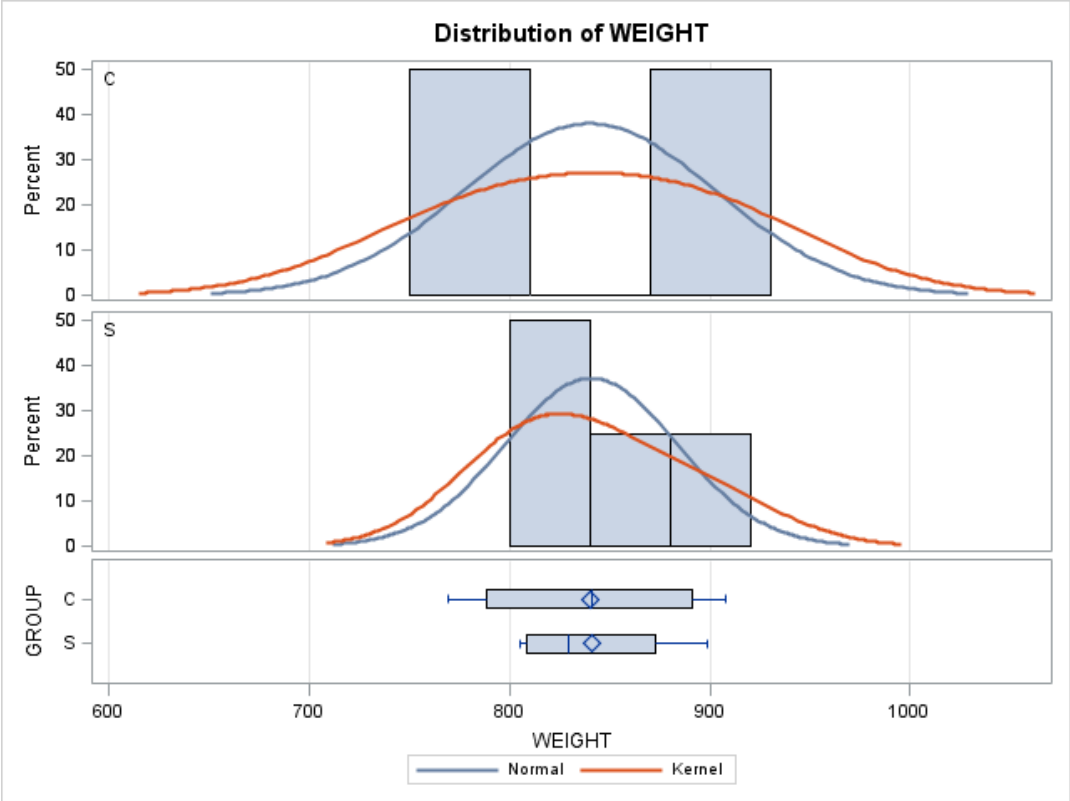
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	840.0	63.0185	31.5093	769.0	908.0
S	4	840.8	42.9603	21.4801	805.0	899.0
Diff (1-2)		-0.7500	53.9301	38.1344		

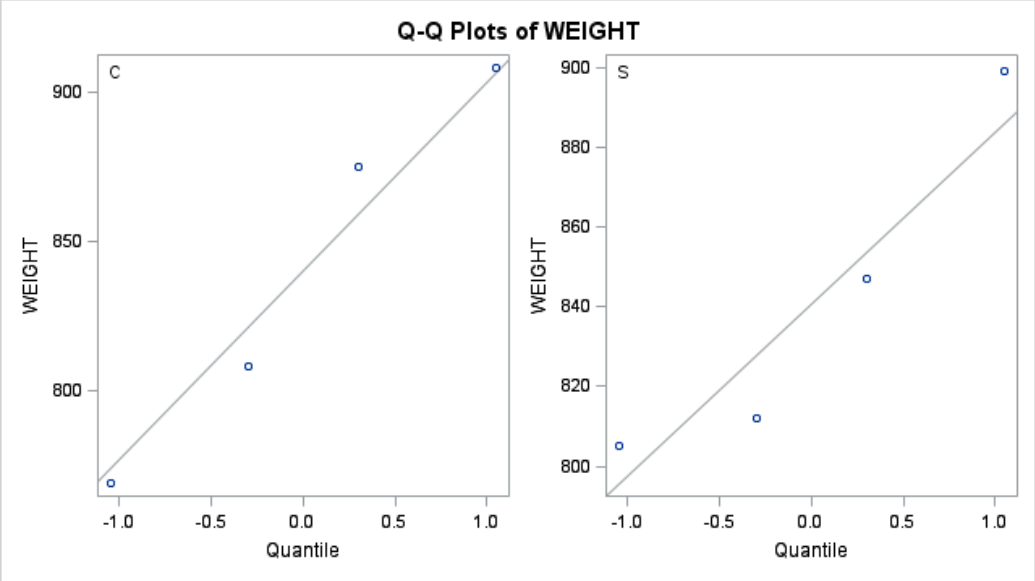
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		840.0	739.7	940.3	63.0185	35.6993	235.0
S		840.8	772.4	909.1	42.9603	24.3365	160.2
Diff (1-2)	**Pooled**	-0.7500	-94.0614	92.5614	53.9301	34.7522	118.8
Diff (1-2)	**Satterthwaite**	-0.7500	-97.1670	95.6670			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.02	0.9849
Satterthwaite	Unequal	5.2931	-0.02	0.9850

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.15	0.5453





COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=21

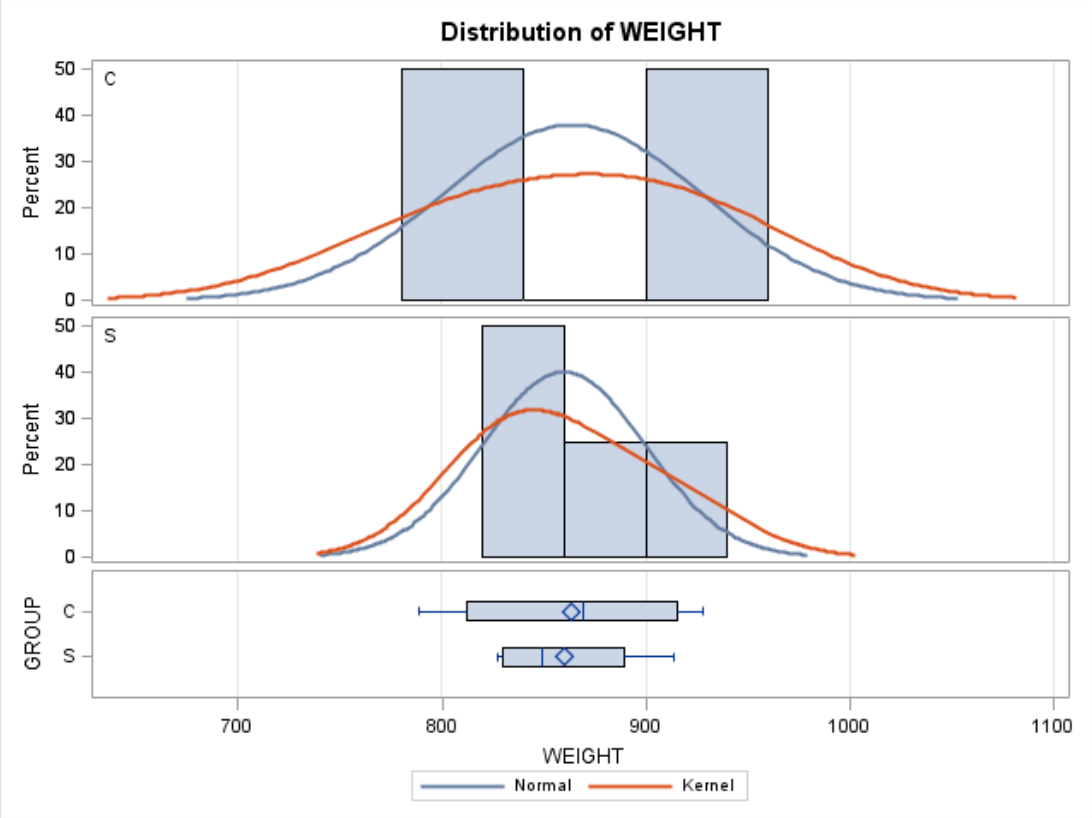
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	863.8	63.1104	31.5552	789.0	928.0
S	4	859.8	39.8278	19.9139	827.0	914.0
Diff (1-2)		4.0000	52.7692	37.3134		

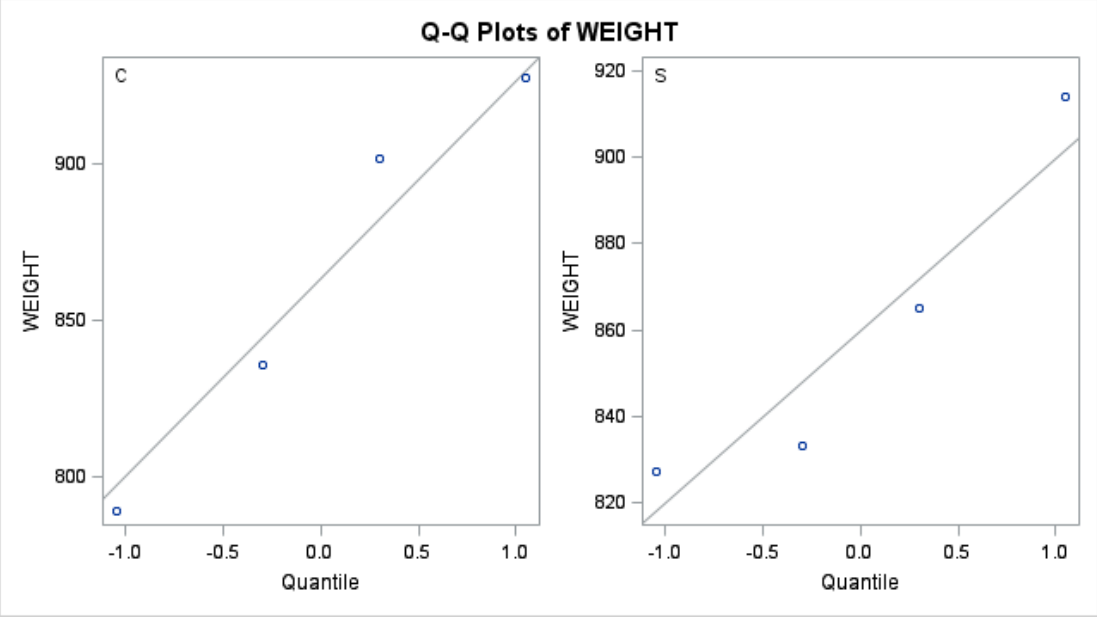
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		863.8	763.3	964.2	63.1104	35.7514	235.3
S		859.8	796.4	923.1	39.8278	22.5620	148.5
Diff (1-2)	**Pooled**	4.0000	-87.3027	95.3027	52.7692	34.0041	116.2
Diff (1-2)	**Satterthwaite**	4.0000	-91.5624	99.5624			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.11	0.9181
Satterthwaite	Unequal	5.0624	0.11	0.9187

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.51	0.4695


Distribution of WEIGHT
C
S
Percent
GROUP
WEIGHT
Normal
Kernel


Q-Q Plots of WEIGHT
C
S
WEIGHT
Quantile

COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=24

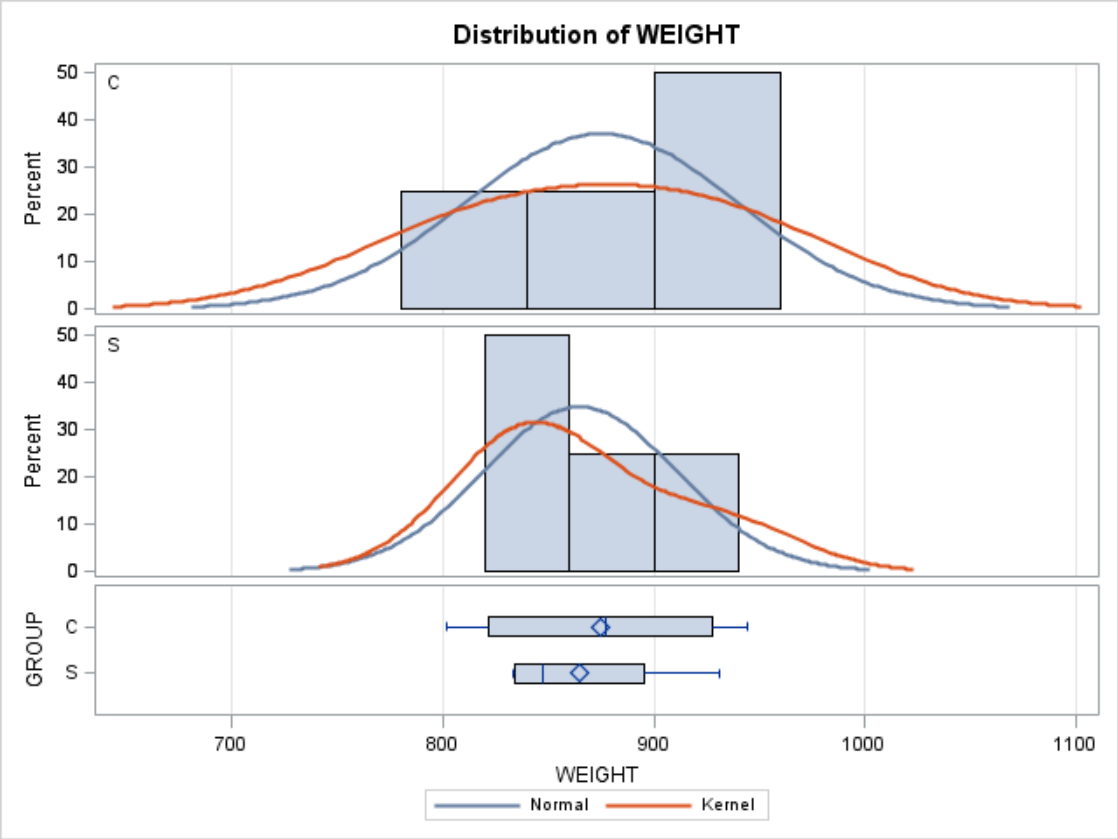
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	875.0	64.6735	32.3368	802.0	944.0
S	4	864.8	45.8430	22.9215	833.0	931.0
Diff (1-2)		10.2500	56.0547	39.6366		

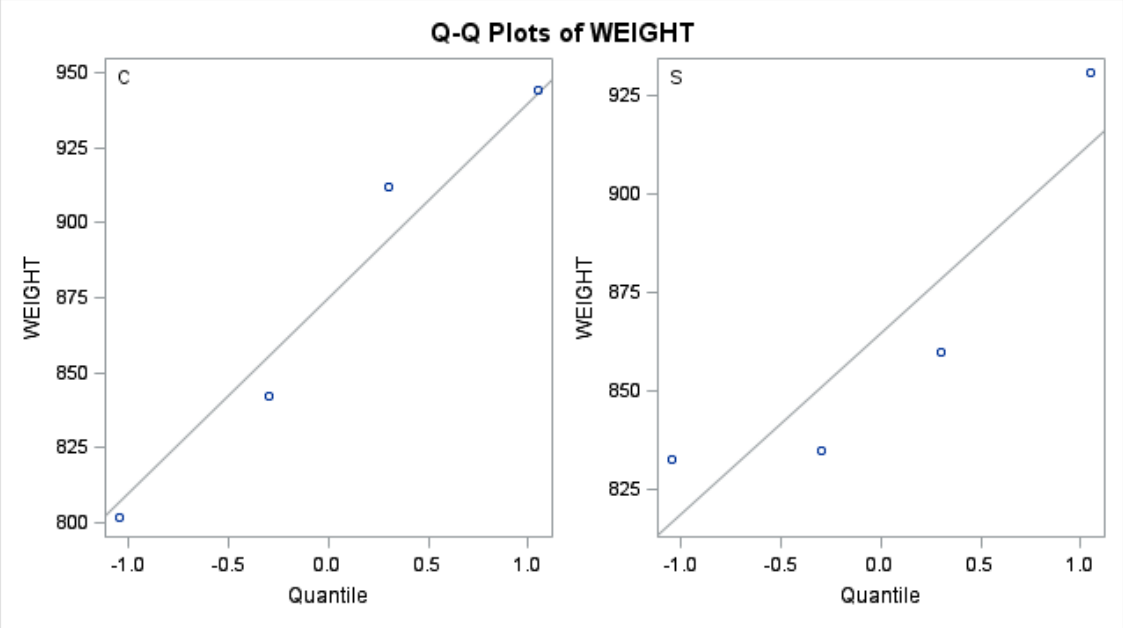
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		875.0	772.1	977.9	64.6735	36.6369	241.1
S		864.8	791.8	937.7	45.8430	25.9696	170.9
Diff (1-2)	**Pooled**	10.2500	-86.7373	107.2	56.0547	36.1213	123.4
Diff (1-2)	**Satterthwaite**	10.2500	-89.3749	109.9			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.26	0.8046
Satterthwaite	Unequal	5.407	0.26	0.8055

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.99	0.5862


Distribution of WEIGHT
C
S
Percent
GROUP
WEIGHT
700
800
900
1000
1100
Normal
Kernel


Q-Q Plots of WEIGHT
C
S
WEIGHT
Quantile
-1.0
-0.5
0.0
0.5
1.0

COMPARISON OF COLONY WEIGHT IN SULFOXAFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WEIGHT
DAT=27

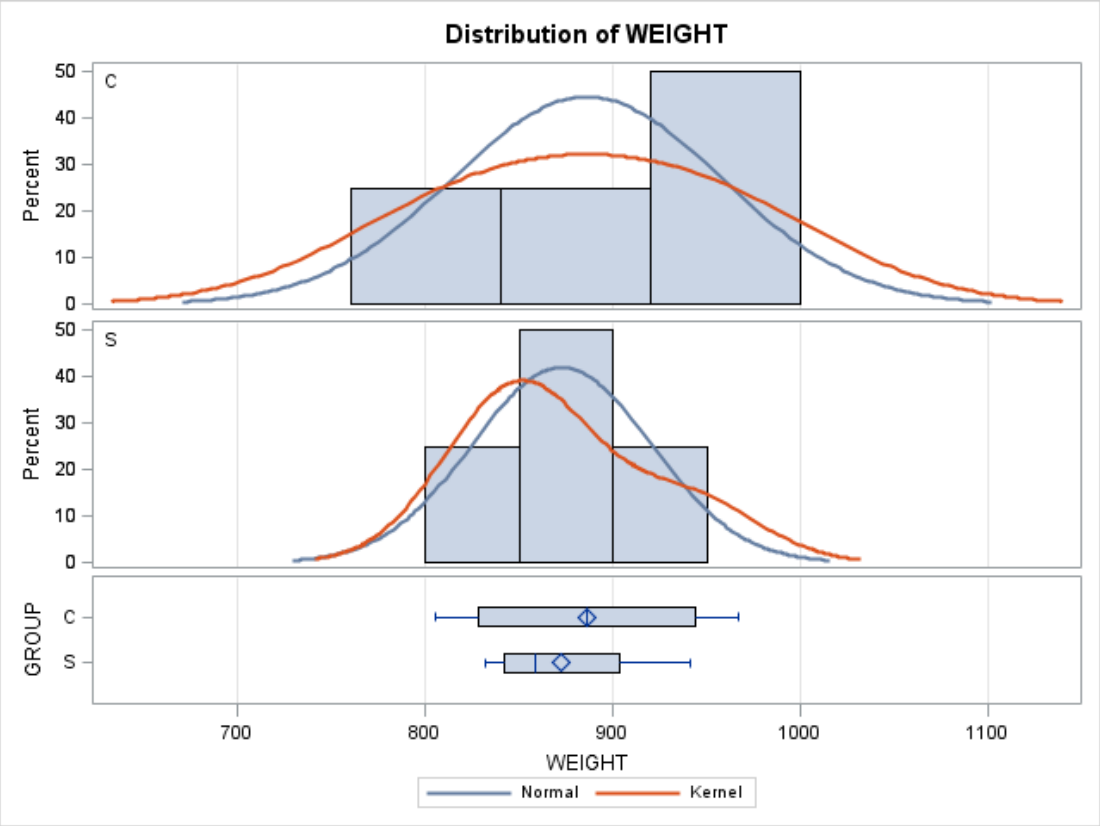
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	886.0	71.7263	35.8632	805.0	967.0
S	4	872.5	47.6410	23.8205	832.0	941.0
Diff (1-2)		13.5000	60.8865	43.0533		

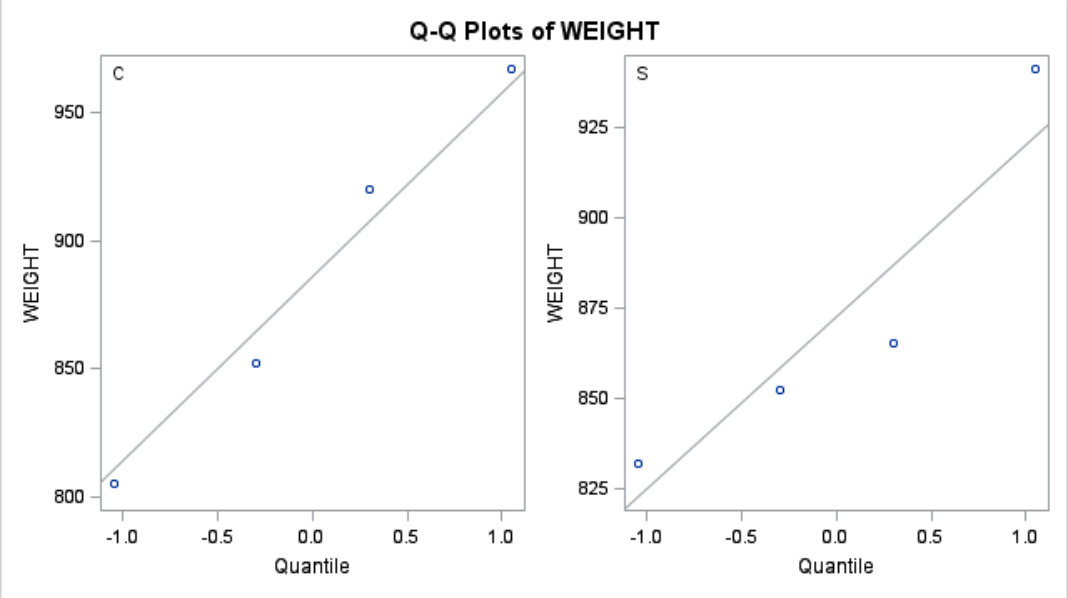
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		886.0	771.9	1000.1	71.7263	40.6322	267.4
S		872.5	796.7	948.3	47.6410	26.9881	177.6
Diff (1-2)	**Pooled**	13.5000	-91.8475	118.8	60.8865	39.2349	134.1
Diff (1-2)	**Satterthwaite**	13.5000	-95.8090	122.8			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.31	0.7645
Satterthwaite	Unequal	5.2158	0.31	0.7660

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.27	0.5190


Distribution of WEIGHT
C
S
Percent
GROUP
WEIGHT
Normal
Kernel


Q-Q Plots of WEIGHT
C
S
WEIGHT
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=-4

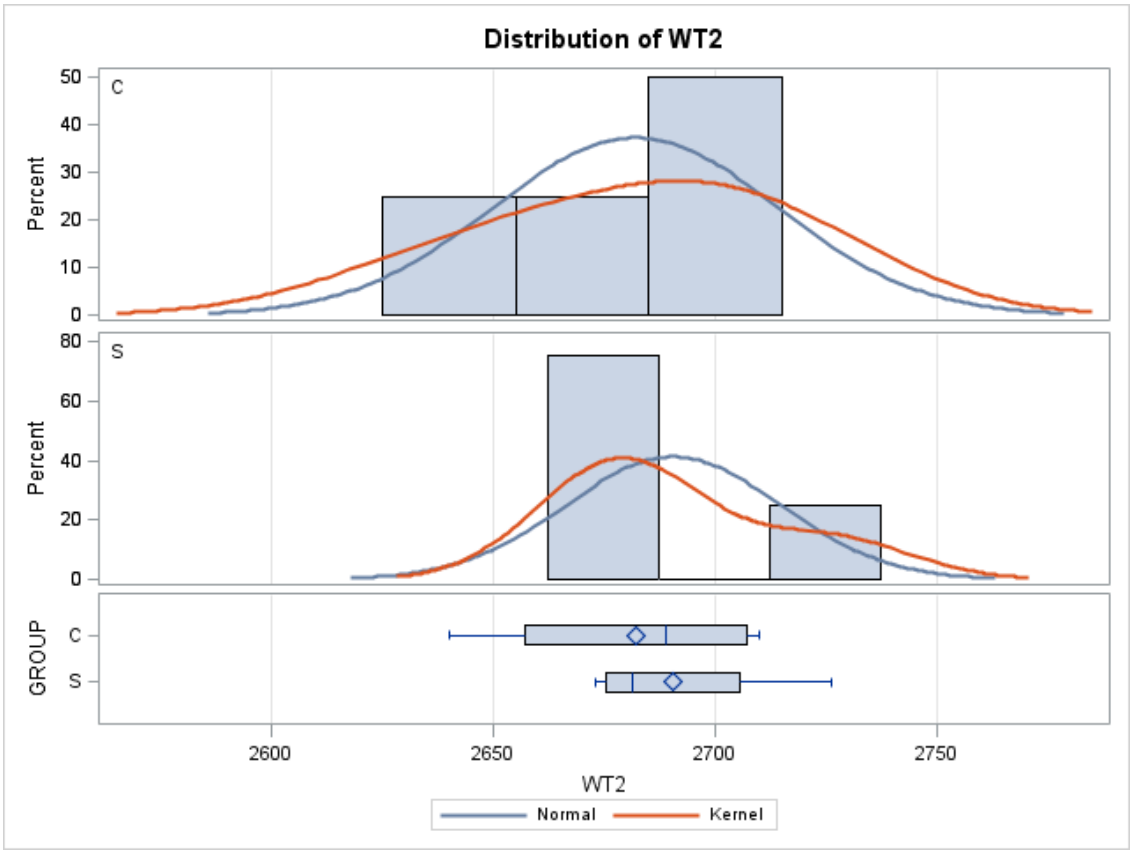
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2682.0	32.1248	16.0624	2640.0	2710.0
S	4	2690.5	24.1730	12.0865	2673.0	2726.0
Diff (1-2)		-8.5000	28.4283	20.1018		

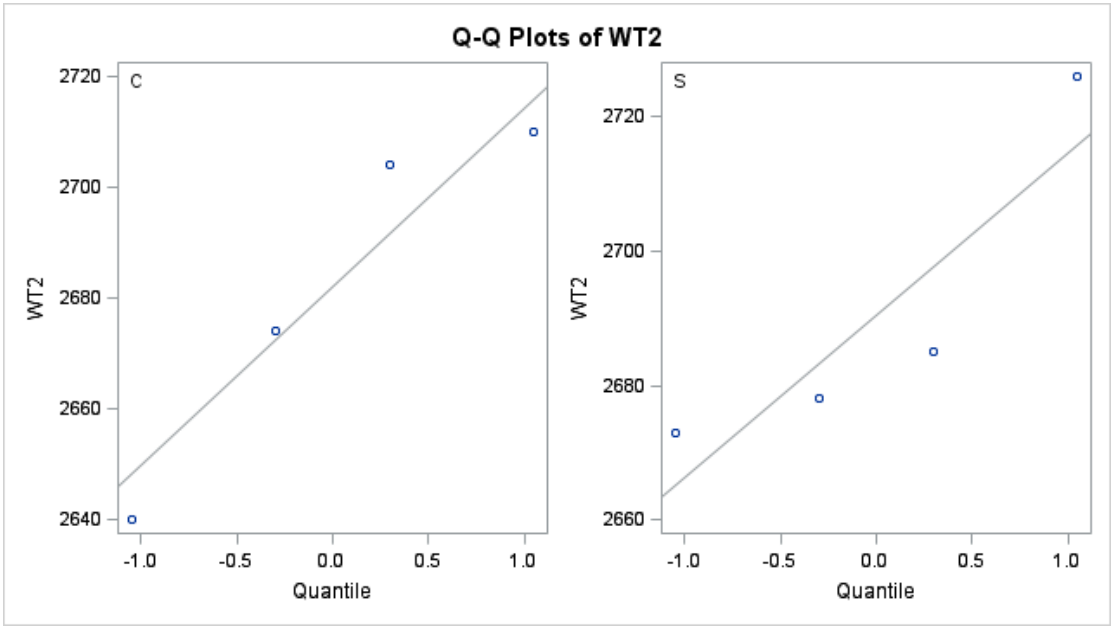
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2682.0	2630.9	2733.1	32.1248	18.1983	119.8
S		2690.5	2652.0	2729.0	24.1730	13.6937	90.1301
Diff (1-2)	**Pooled**	-8.5000	-57.6874	40.6874	28.4283	18.3190	62.6009
Diff (1-2)	**Satterthwaite**	-8.5000	-58.6166	41.6166			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.42	0.6871
Satterthwaite	Unequal	5.5725	-0.42	0.6882

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.77	0.6519


Distribution of WT2
C
S
Percent
GROUP
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=-2

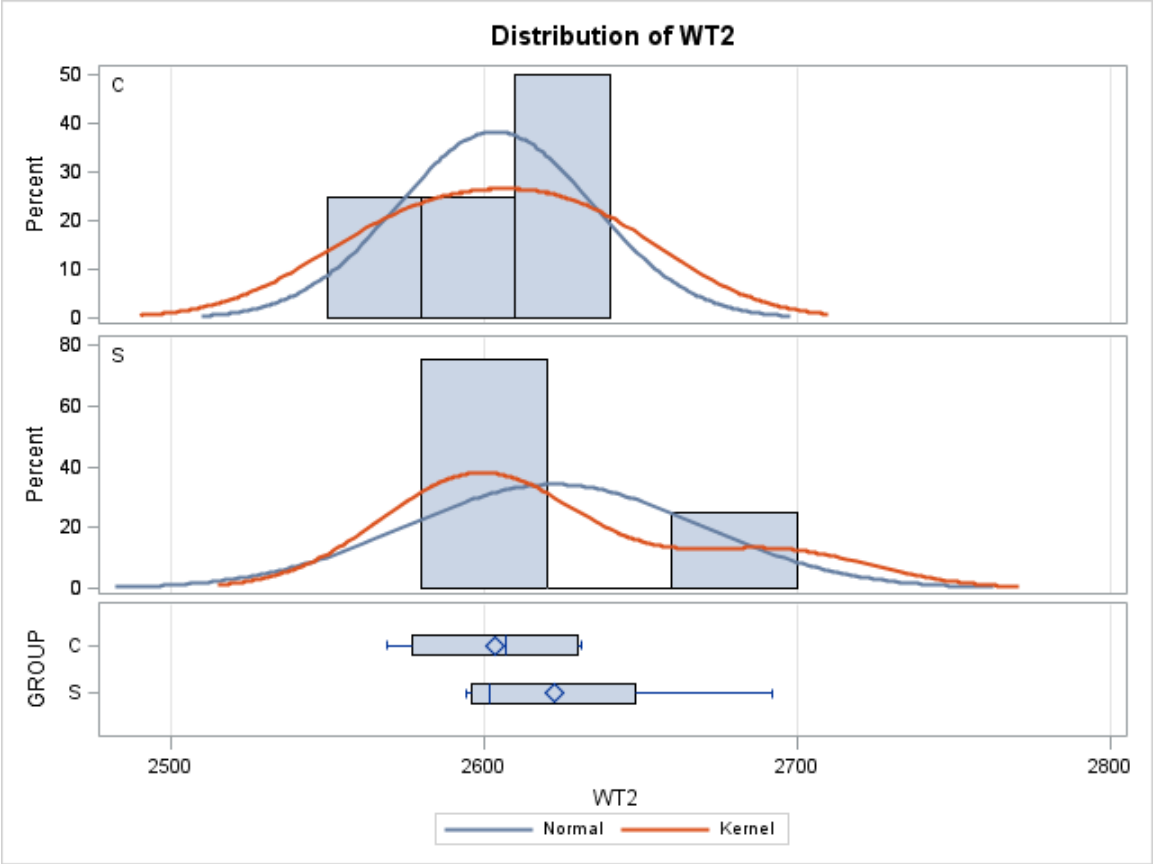
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2603.5	31.2996	15.6498	2569.0	2631.0
S	4	2622.3	46.7217	23.3608	2594.0	2692.0
Diff (1-2)		-18.7500	39.7655	28.1184		

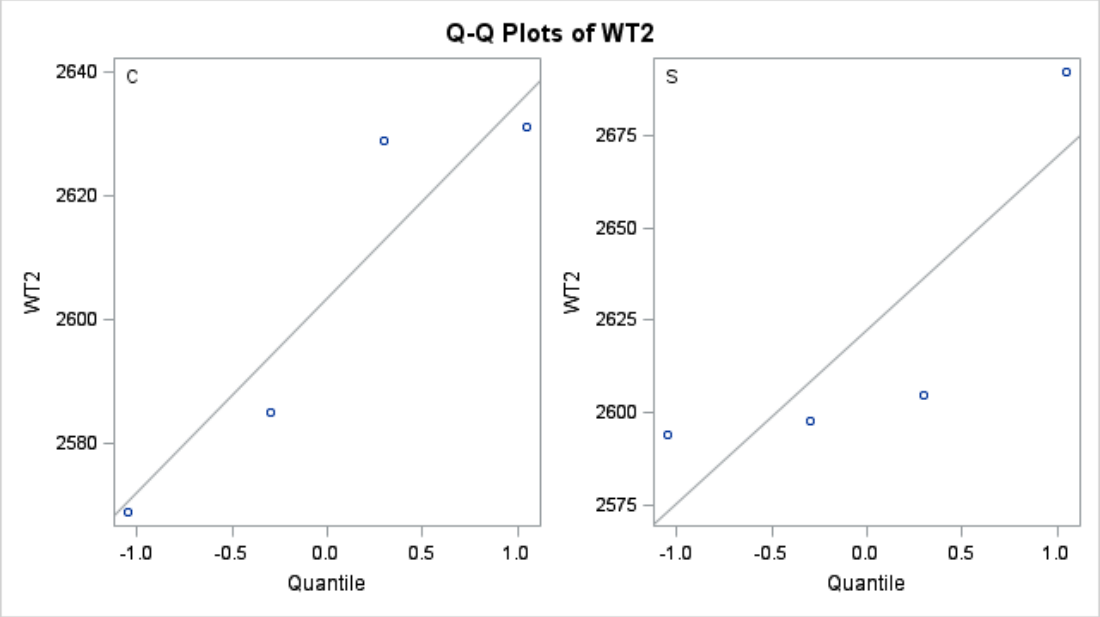
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2603.5	2553.7	2653.3	31.2996	17.7309	116.7
S		2622.3	2547.9	2696.6	46.7217	26.4674	174.2
Diff (1-2)	**Pooled**	-18.7500	-87.5533	50.0533	39.7655	25.6246	87.5662
Diff (1-2)	**Satterthwaite**	-18.7500	-90.0412	52.5412			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.67	0.5297
Satterthwaite	Unequal	5.2413	-0.67	0.5331

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.23	0.5275


Distribution of WT2
C
S
Percent
GROUP
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=-1

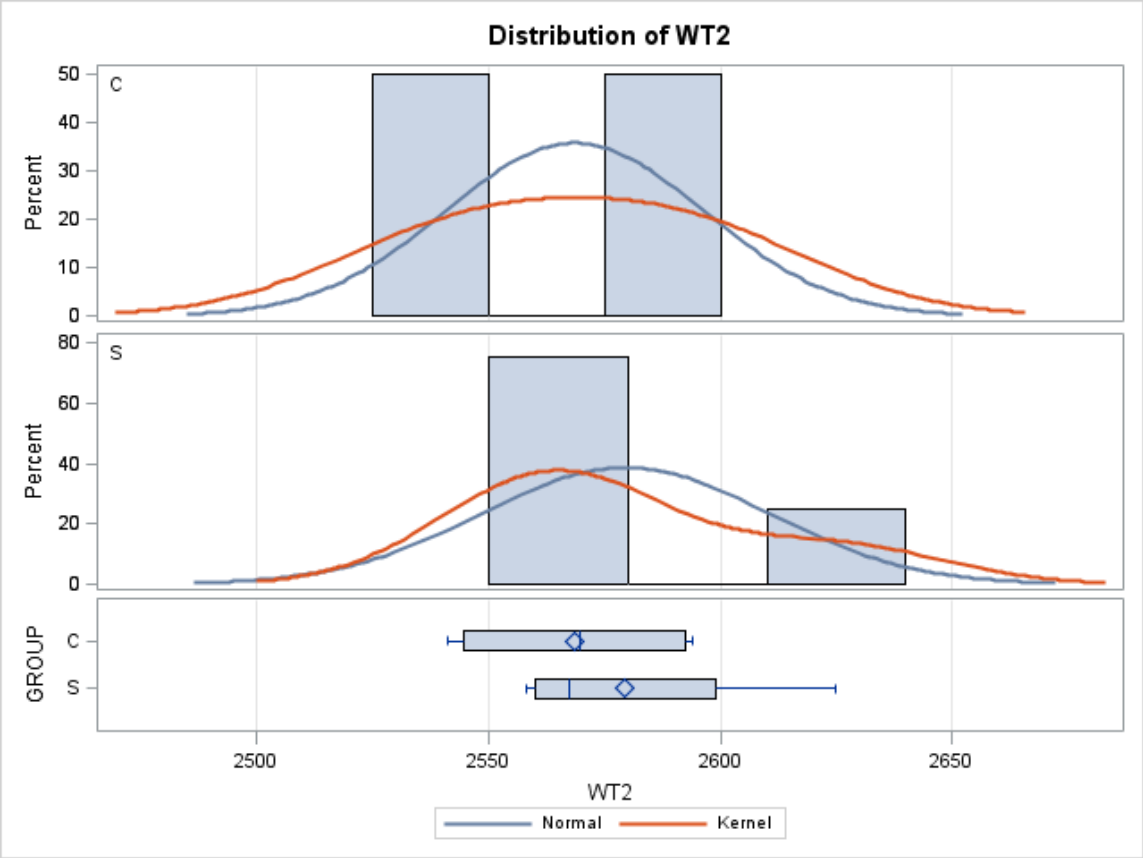
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2568.5	27.8867	13.9433	2541.0	2594.0
S	4	2579.5	30.9892	15.4946	2558.0	2625.0
Diff (1-2)		-11.0000	29.4788	20.8447		

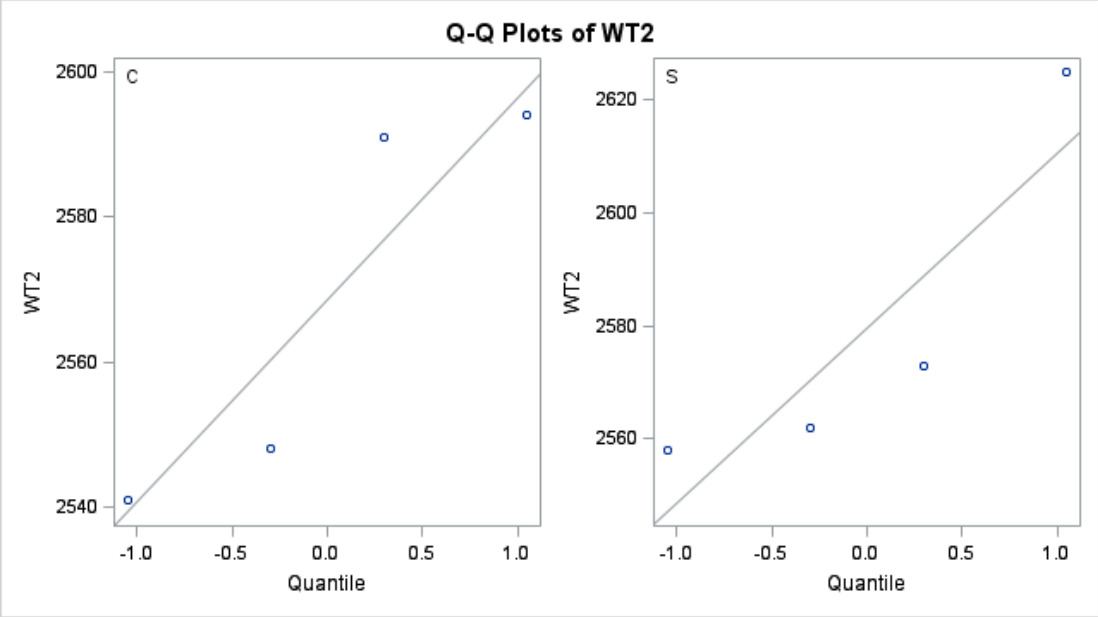
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2568.5	2524.1	2612.9	27.8867	15.7975	104.0
S		2579.5	2530.2	2628.8	30.9892	17.5551	115.5
Diff (1-2)	**Pooled**	-11.0000	-62.0051	40.0051	29.4788	18.9959	64.9143
Diff (1-2)	**Satterthwaite**	-11.0000	-62.1419	40.1419			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	-0.53	0.6166
Satterthwaite	Unequal	5.9344	-0.53	0.6168

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.23	0.8664


Distribution of WT2
C
S
Percent
GROUP
WT2
2500
2550
2600
2650
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile
-1.0
-0.5
0.0
0.5
1.0

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=1

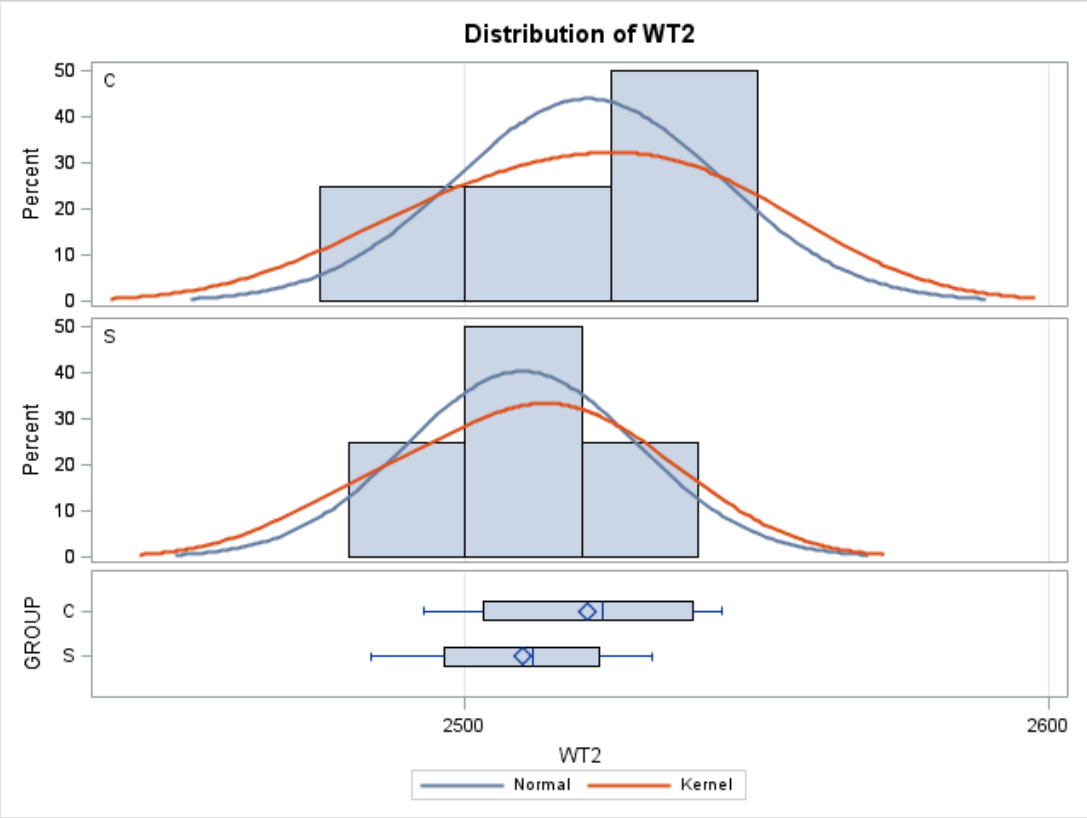
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2521.0	22.7010	11.3505	2493.0	2544.0
S	4	2509.8	19.8053	9.9027	2484.0	2532.0
Diff (1-2)		11.2500	21.3024	15.0631		

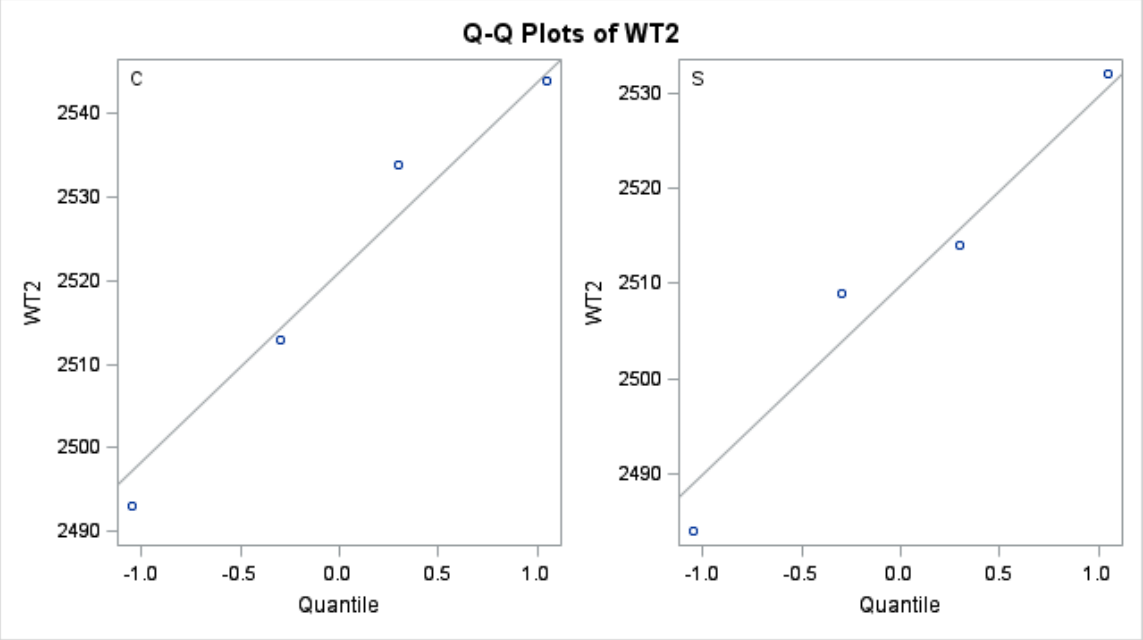
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2521.0	2484.9	2557.1	22.7010	12.8599	84.6416
S		2509.8	2478.2	2541.3	19.8053	11.2195	73.8450
Diff (1-2)	**Pooled**	11.2500	-25.6080	48.1080	21.3024	13.7271	46.9093
Diff (1-2)	**Satterthwaite**	11.2500	-25.7729	48.2729			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.75	0.4834
Satterthwaite	Unequal	5.8916	0.75	0.4839

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.31	0.8279


Distribution of WT2
C
S
Percent
0
10
20
30
40
50
GROUP
C
S
2500
2600
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
2490
2500
2510
2520
2530
2540
-1.0
-0.5
0.0
0.5
1.0
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=3

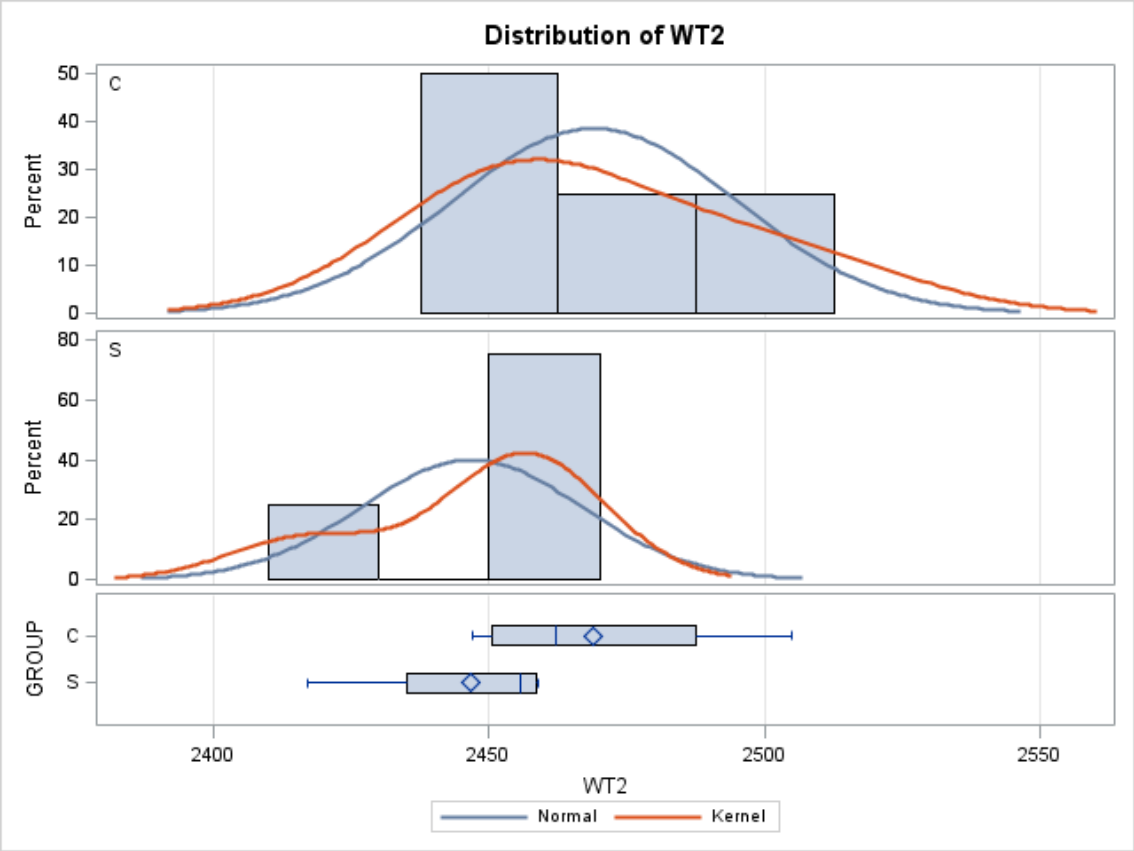
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2469.0	25.8586	12.9293	2447.0	2505.0
S	4	2446.8	20.0062	10.0031	2417.0	2459.0
Diff (1-2)		22.2500	23.1184	16.3471		

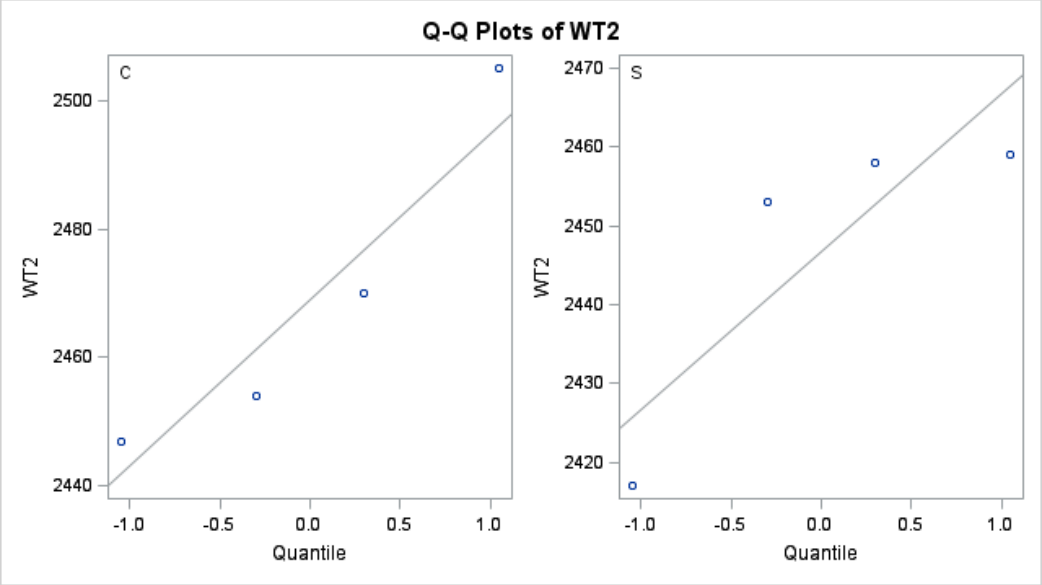
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2469.0	2427.9	2510.1	25.8586	14.6486	96.4150
S		2446.8	2414.9	2478.6	20.0062	11.3333	74.5942
Diff (1-2)	**Pooled**	22.2500	-17.7500	62.2500	23.1184	14.8973	50.9081
Diff (1-2)	**Satterthwaite**	22.2500	-18.3695	62.8695			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	1.36	0.2224
Satterthwaite	Unequal	5.6441	1.36	0.2253

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.67	0.6837


Distribution of WT2
C
S
Percent
GROUP
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=5

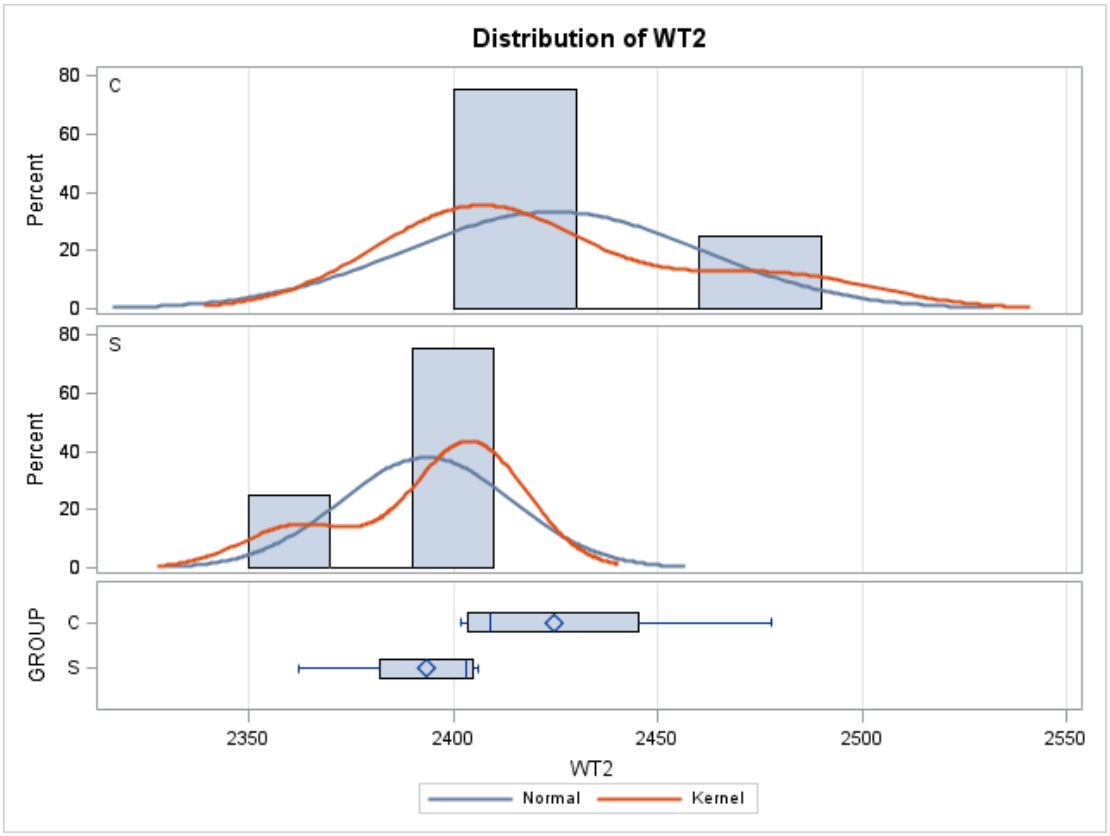
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2424.5	35.9676	17.9838	2402.0	2478.0
S	4	2393.5	21.0634	10.5317	2362.0	2406.0
Diff (1-2)		31.0000	29.4732	20.8407		

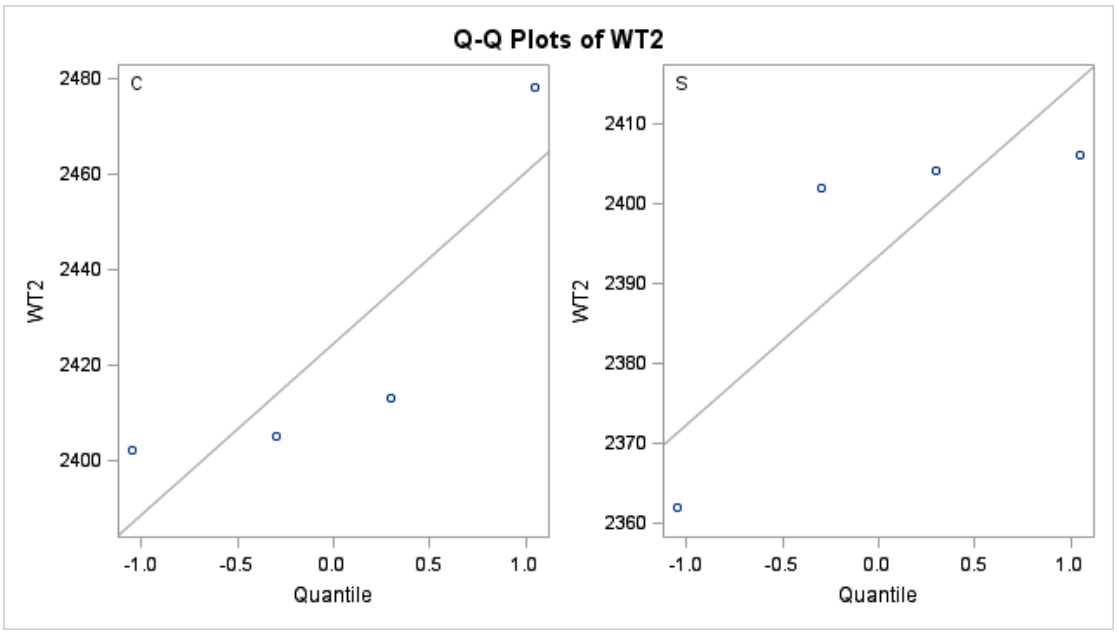
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2424.5	2367.3	2481.7	35.9676	20.3753	134.1
S		2393.5	2360.0	2427.0	21.0634	11.9322	78.5359
Diff (1-2)	**Pooled**	31.0000	-19.9953	81.9953	29.4732	18.9923	64.9018
Diff (1-2)	**Satterthwaite**	31.0000	-23.1056	85.1056			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	1.49	0.1875
Satterthwaite	Unequal	4.8412	1.49	0.1989

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.92	0.4029


Distribution of WT2
C
S
Percent
GROUP
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=7

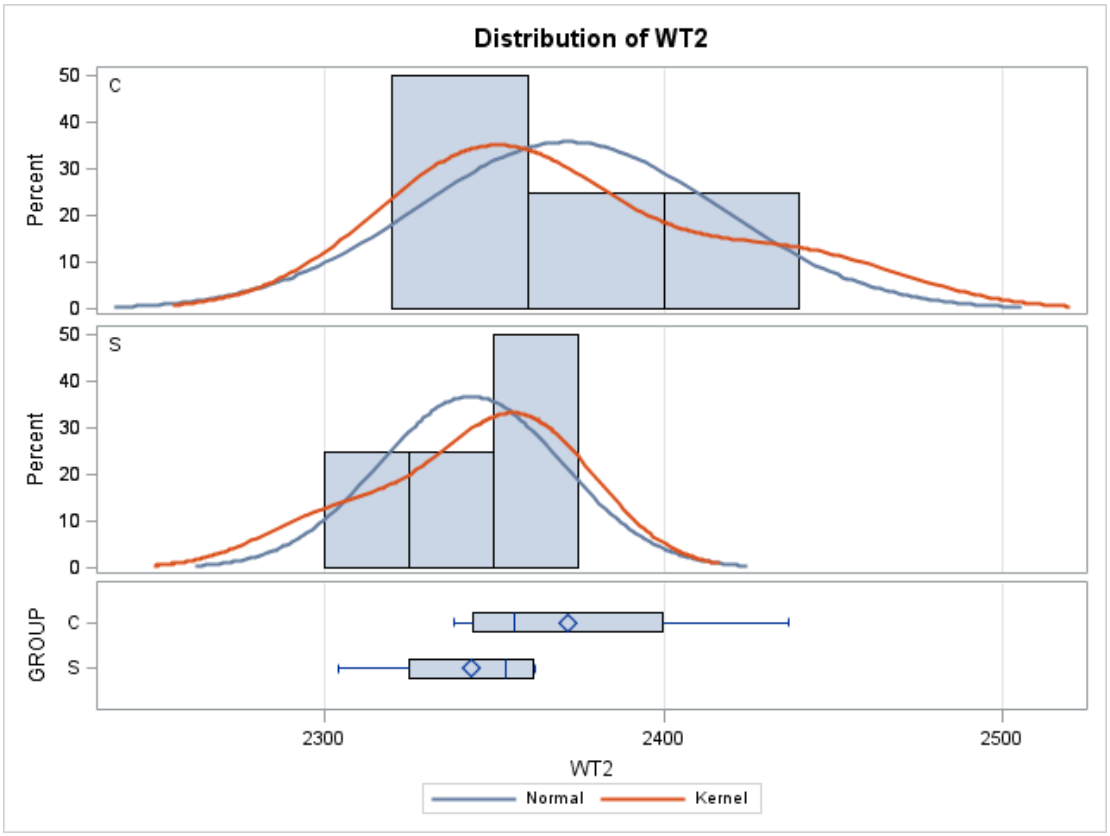
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2371.8	44.5898	22.2949	2338.0	2437.0
S	4	2343.3	27.1708	13.5854	2304.0	2362.0
Diff (1-2)		28.5000	36.9222	26.1079		

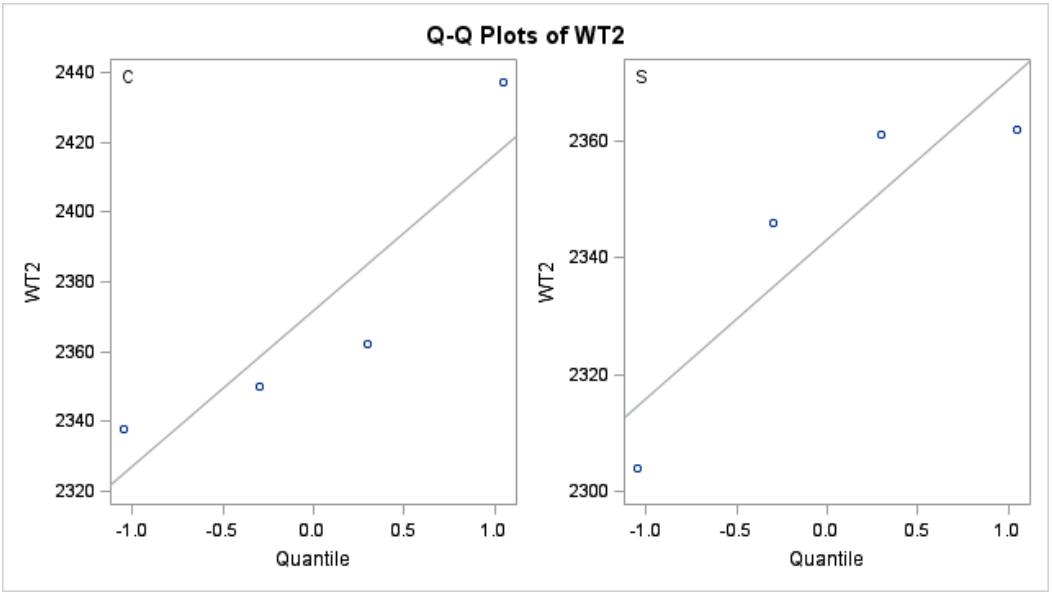
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2371.8	2300.8	2442.7	44.5898	25.2597	166.3
S		2343.3	2300.0	2386.5	27.1708	15.3919	101.3
Diff (1-2)	**Pooled**	28.5000	-35.3838	92.3838	36.9222	23.7924	81.3052
Diff (1-2)	**Satterthwaite**	28.5000	-38.7844	95.7844			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	1.09	0.3169
Satterthwaite	Unequal	4.9579	1.09	0.3252

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.69	0.4374


Distribution of WT2
C
S
Percent
GROUP
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=10

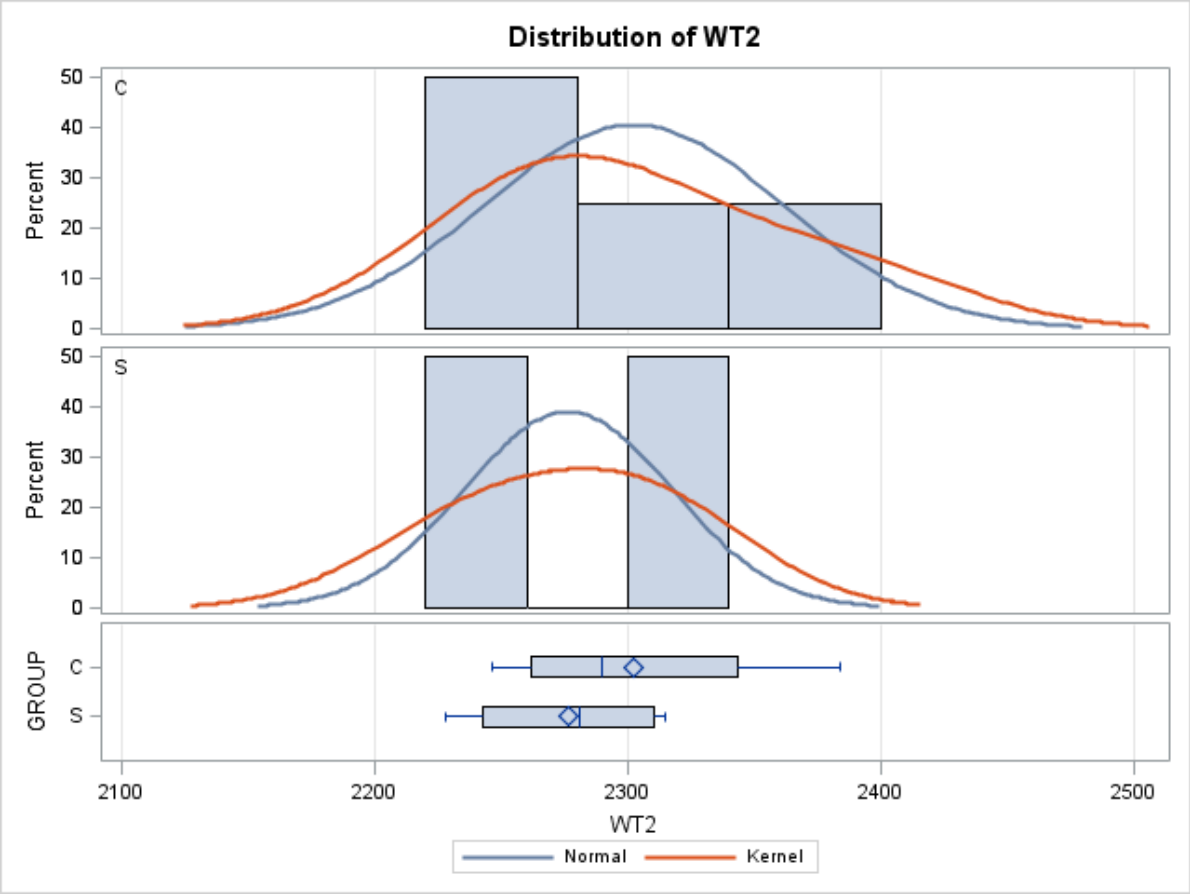
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2302.3	59.1178	29.5589	2246.0	2384.0
S	4	2276.3	40.9339	20.4669	2228.0	2315.0
Diff (1-2)		26.0000	50.8454	35.9531		

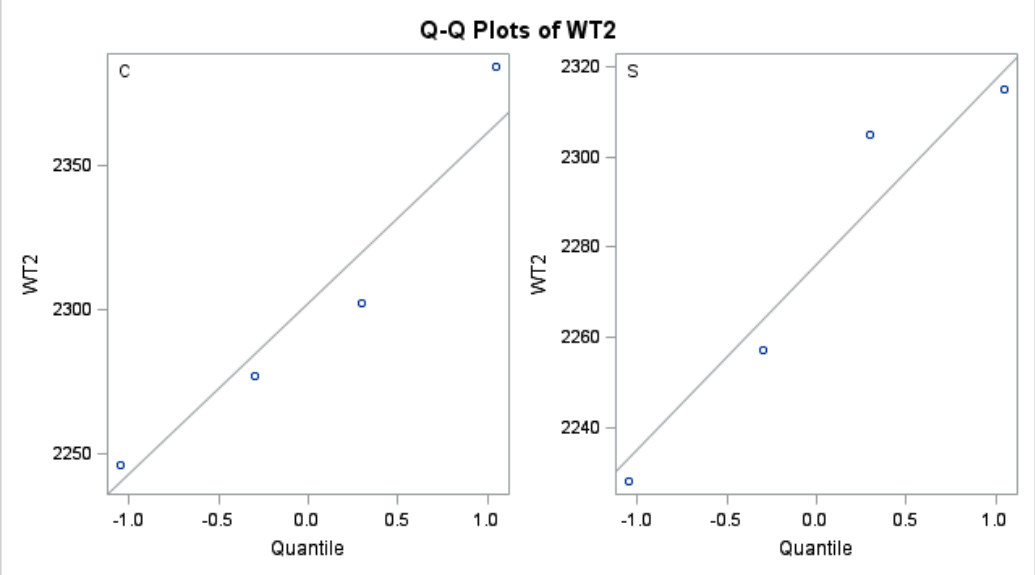
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2302.3	2208.2	2396.3	59.1178	33.4896	220.4
S		2276.3	2211.1	2341.4	40.9339	23.1886	152.6
Diff (1-2)	**Pooled**	26.0000	-61.9741	114.0	50.8454	32.7644	112.0
Diff (1-2)	**Satterthwaite**	26.0000	-64.6830	116.7			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.72	0.4968
Satterthwaite	Unequal	5.339	0.72	0.5000

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.09	0.5614


Distribution of WT2
C
S
Percent
GROUP
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=13

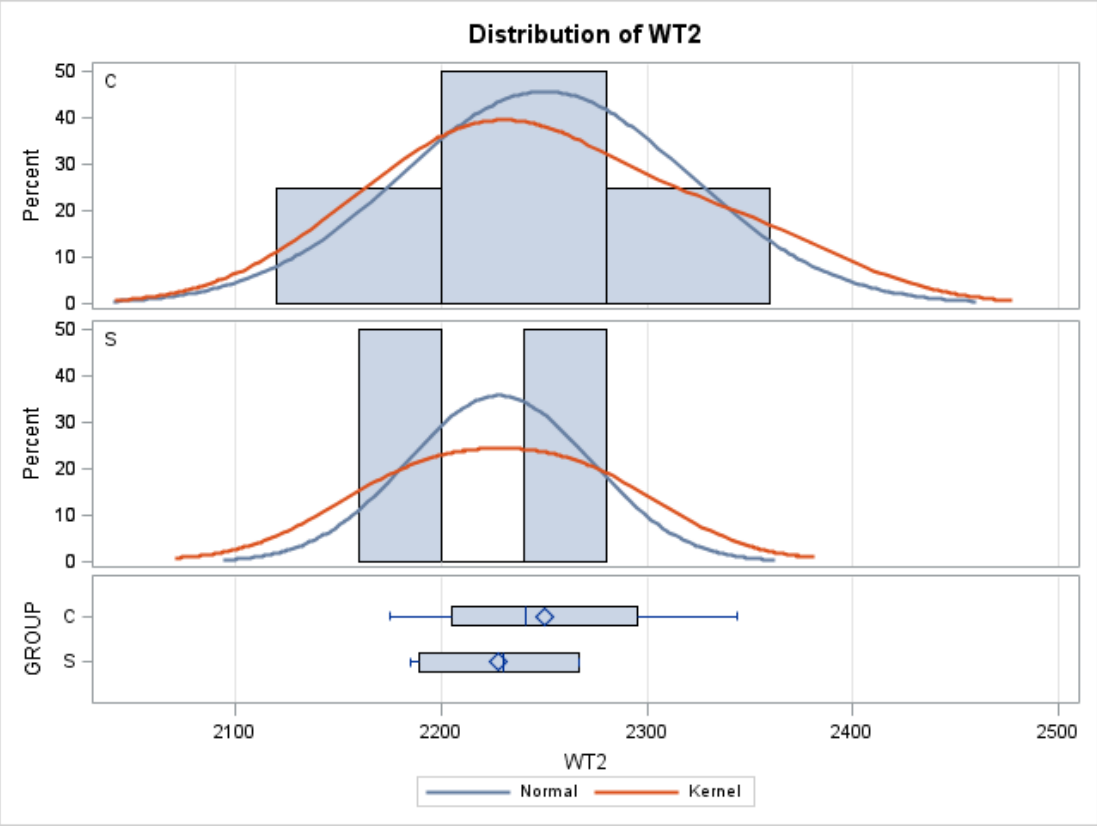
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2250.3	69.9351	34.9675	2175.0	2344.0
S	4	2228.0	44.6094	22.3047	2185.0	2267.0
Diff (1-2)		22.2500	58.6554	41.4756		

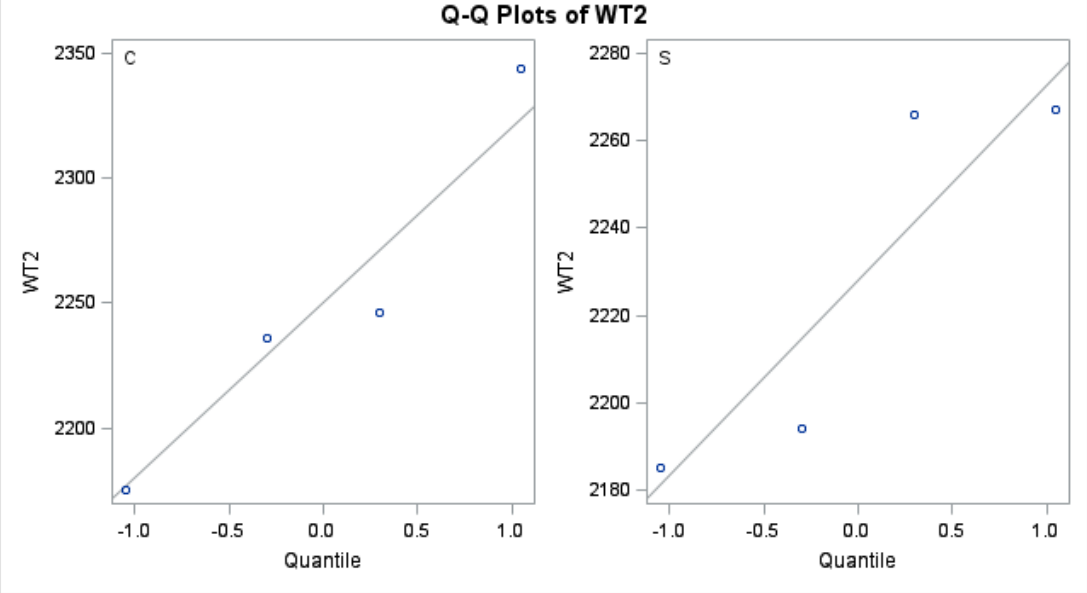
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2250.3	2139.0	2361.5	69.9351	39.6175	260.8
S		2228.0	2157.0	2299.0	44.6094	25.2708	166.3
Diff (1-2)	**Pooled**	22.2500	-79.2372	123.7	58.6554	37.7972	129.2
Diff (1-2)	**Satterthwaite**	22.2500	-83.7743	128.3			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.54	0.6109
Satterthwaite	Unequal	5.0945	0.54	0.6142

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.46	0.4796


Distribution of WT2
C
S
Percent
GROUP
C
S
2100
2200
2300
2400
2500
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile
2350
2300
2250
2200
2280
2260
2240
2220
2180
-1.0
-0.5
0.0
0.5
1.0

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=17

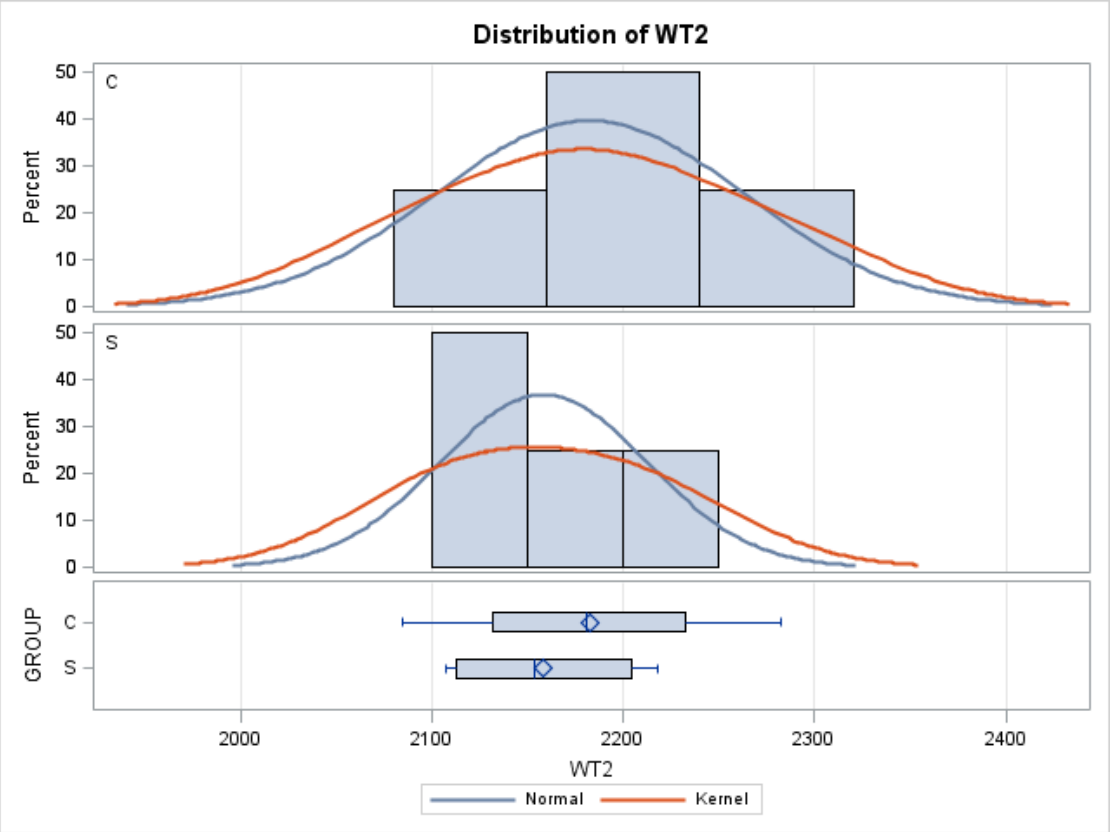
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2182.3	80.4544	40.2272	2085.0	2282.0
S	4	2158.3	54.2364	27.1182	2107.0	2218.0
Diff (1-2)		24.0000	68.6094	48.5142		

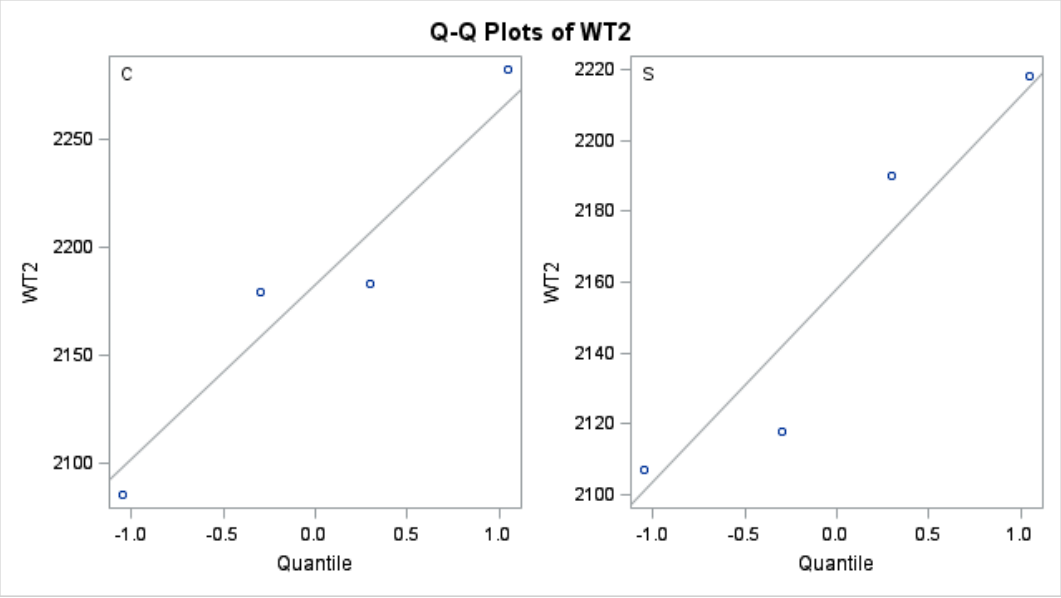
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2182.3	2054.2	2310.3	80.4544	45.5766	300.0
S		2158.3	2071.9	2244.6	54.2364	30.7243	202.2
Diff (1-2)	**Pooled**	24.0000	-94.7099	142.7	68.6094	44.2114	151.1
Diff (1-2)	**Satterthwaite**	24.0000	-98.8785	146.9			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.49	0.6384
Satterthwaite	Unequal	5.2599	0.49	0.6408

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	2.20	0.5339


Distribution of WT2
C
S
Percent
GROUP
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=21

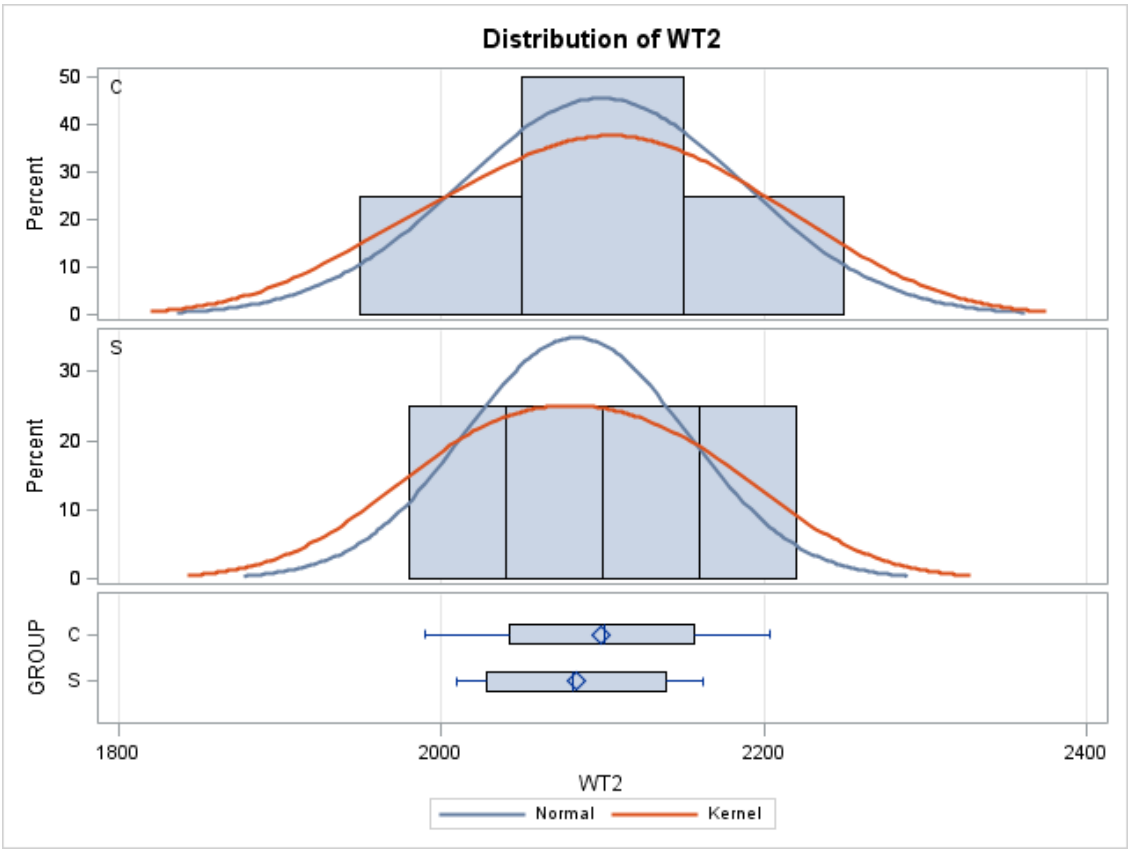
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2099.3	87.6180	43.8090	1990.0	2204.0
S	4	2083.5	68.5590	34.2795	2009.0	2162.0
Diff (1-2)		15.7500	78.6678	55.6265		

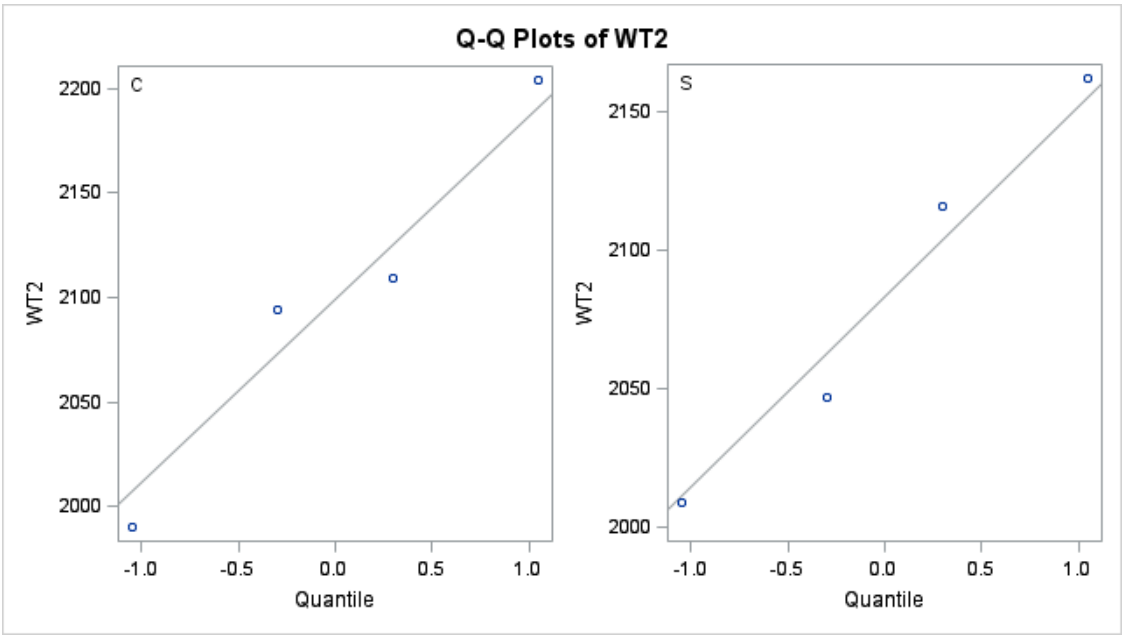
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2099.3	1959.8	2238.7	87.6180	49.6347	326.7
S		2083.5	1974.4	2192.6	68.5590	38.8379	255.6
Diff (1-2)	**Pooled**	15.7500	-120.4	151.9	78.6678	50.6930	173.2
Diff (1-2)	**Satterthwaite**	15.7500	-122.3	153.8			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.28	0.7866
Satterthwaite	Unequal	5.672	0.28	0.7871

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.63	0.6968


Distribution of WT2
C
S
Percent
GROUP
1800
2000
2200
2400
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=24

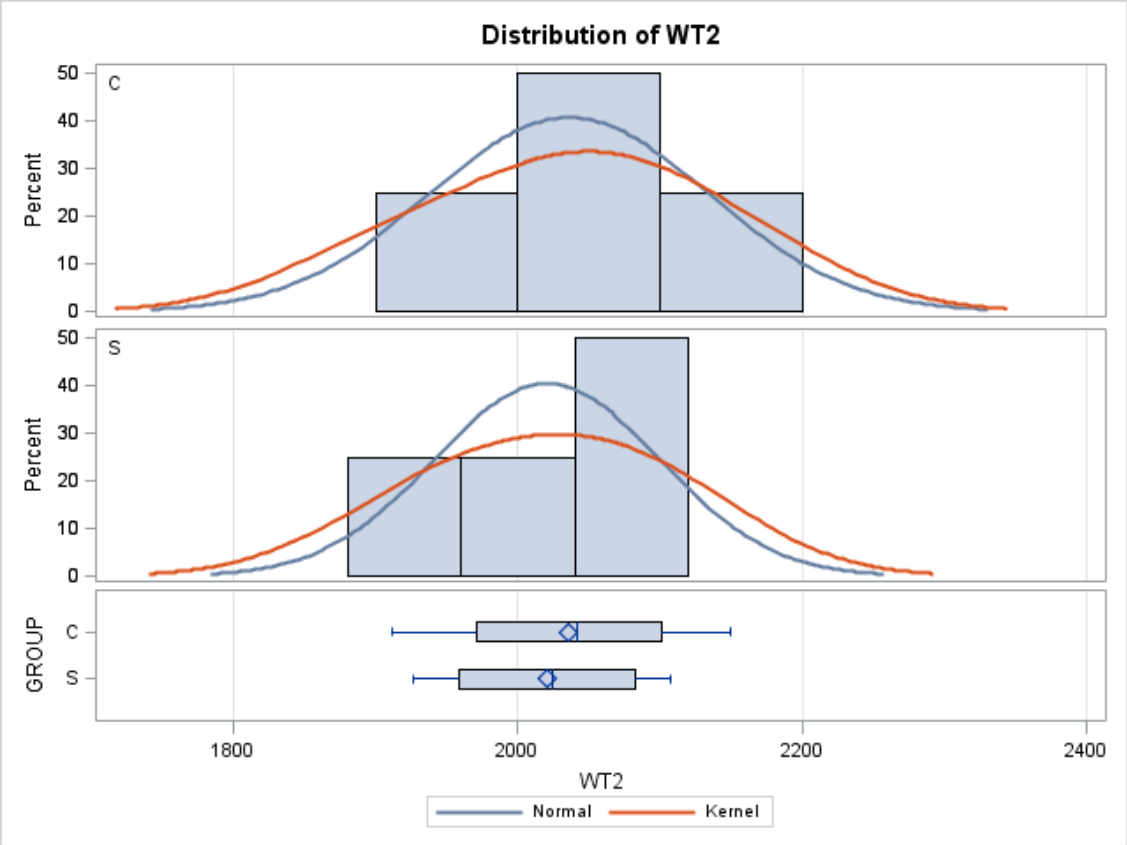
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	2036.0	98.1529	49.0765	1911.0	2150.0
S	4	2020.5	78.9282	39.4641	1926.0	2107.0
Diff (1-2)		15.5000	89.0608	62.9755		

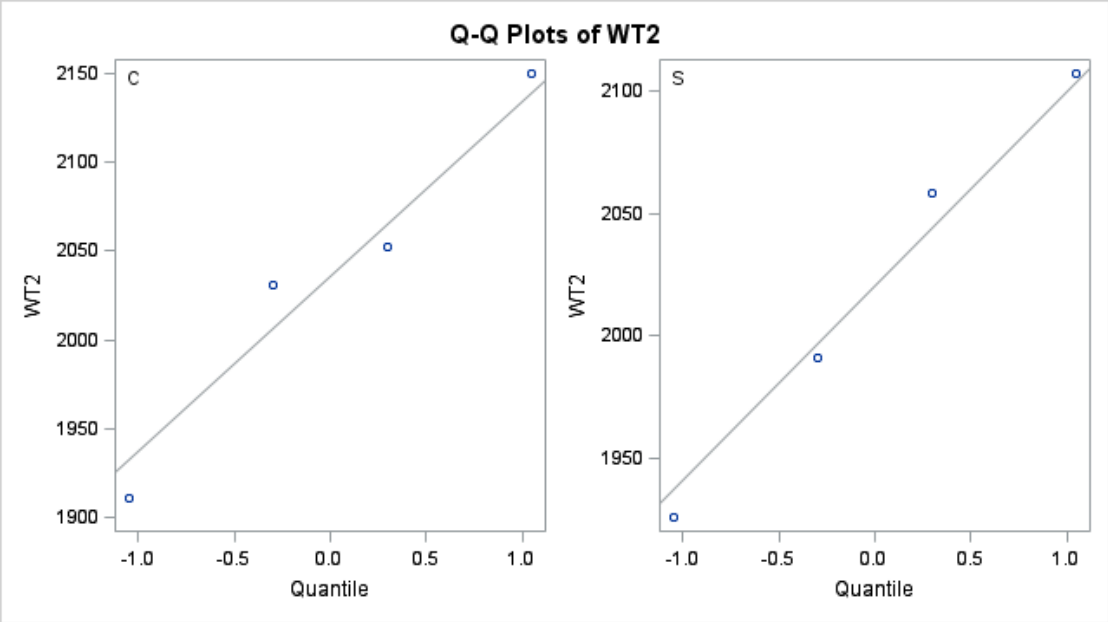
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		2036.0	1879.8	2192.2	98.1529	55.6026	366.0
S		2020.5	1894.9	2146.1	78.9282	44.7120	294.3
Diff (1-2)	**Pooled**	15.5000	-138.6	169.6	89.0608	57.3902	196.1
Diff (1-2)	**Satterthwaite**	15.5000	-140.3	171.3			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.25	0.8138
Satterthwaite	Unequal	5.7358	0.25	0.8142

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.55	0.7289


Distribution of WT2
C
S
Percent
GROUP
1800
2000
2200
2400
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

COMPARISON OF TOTAL COLONY WEIGHT IN SULFOXFLOR-TREATED AND CONTROLS BY DAT

The TTEST Procedure

Variable: WT2
DAT=27

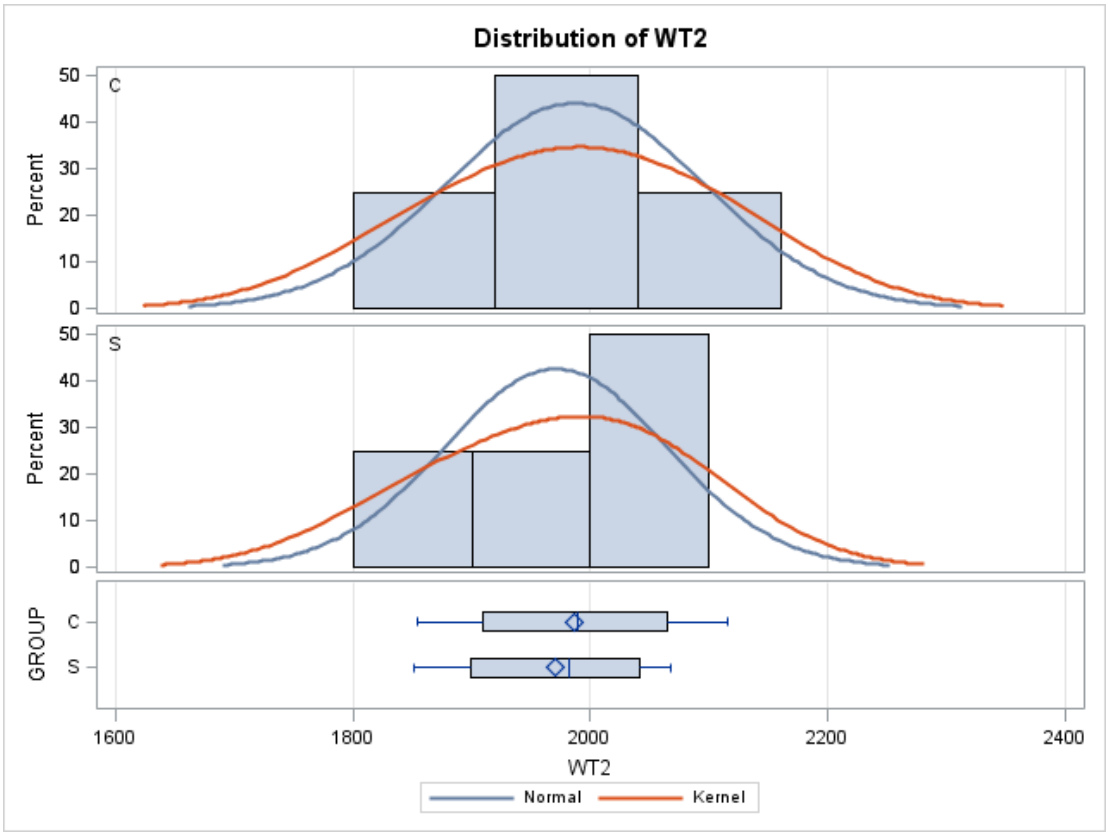
GROUP	N	Mean	Std Dev	Std Err	Minimum	Maximum
C	4	1986.8	108.7	54.3436	1854.0	2116.0
S	4	1970.8	93.7421	46.8711	1851.0	2068.0
Diff (1-2)		16.0000	101.5	71.7644		

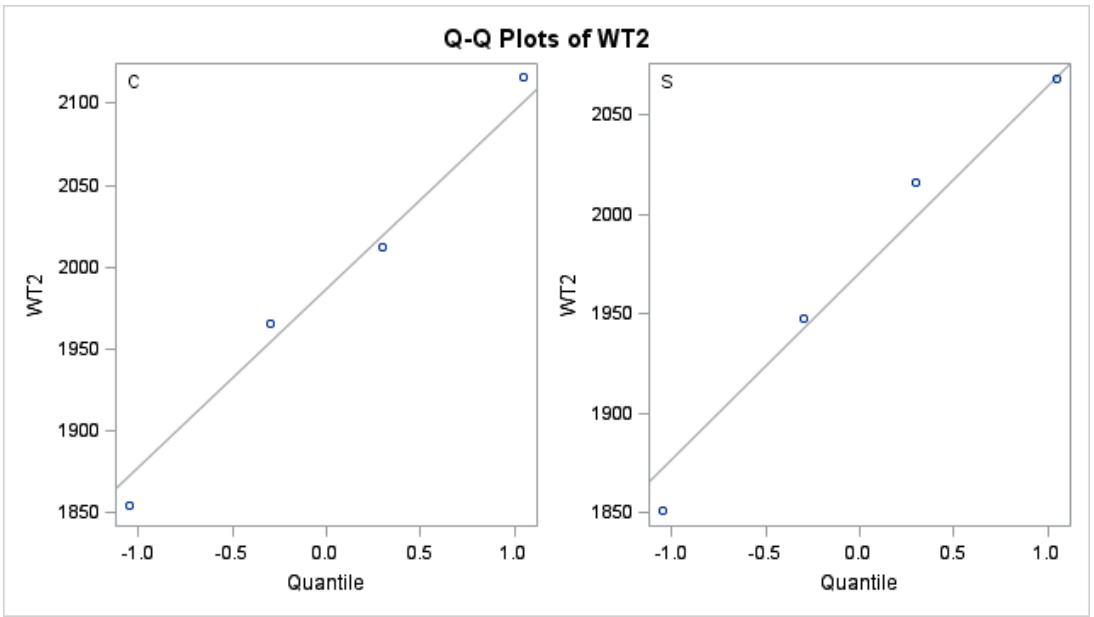
GROUP	Method	Mean	95% CL Mean		Std Dev	95% CL Std Dev	
C		1986.8	1813.8	2159.7	108.7	61.5702	405.2
S		1970.8	1821.6	2119.9	93.7421	53.1039	349.5
Diff (1-2)	**Pooled**	16.0000	-159.6	191.6	101.5	65.3996	223.5
Diff (1-2)	**Satterthwaite**	16.0000	-160.5	192.5			

Method	Variances	DF	t Value	Pr > |t|
Pooled	Equal	6	0.22	0.8310
Satterthwaite	Unequal	5.8733	0.22	0.8311

Equality of Variances

Method	Num DF	Den DF	F Value	Pr > F
Folded F	3	3	1.34	0.8137


Distribution of WT2
C
S
Percent
GROUP
WT2
Normal
Kernel


Q-Q Plots of WT2
C
S
WT2
Quantile

The NPAR1WAY Procedure
DAT=-2

Wilcoxon Scores (Rank Sums) for Variable DEAD Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	17.50	18.0	2.645751	4.3750
S	4	18.50	18.0	2.645751	4.6250

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	17.5000

Normal Approximation

Z	0.0000
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

t Approximation

One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0357
DF	1
Pr > Chi-Square	0.8501


Distribution of Wilcoxon Scores for DEAD
Score
8
7
6
5
4
C
S
GROUP
Pr < Z 0.5000
Pr > |Z| 1.0000

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=-1

Wilcoxon Scores (Rank Sums) for Variable DEAD Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	18.0	18.0	2.618615	4.50
S	4	18.0	18.0	2.618615	4.50

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	18.0000

Normal Approximation

Z	0.0000
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

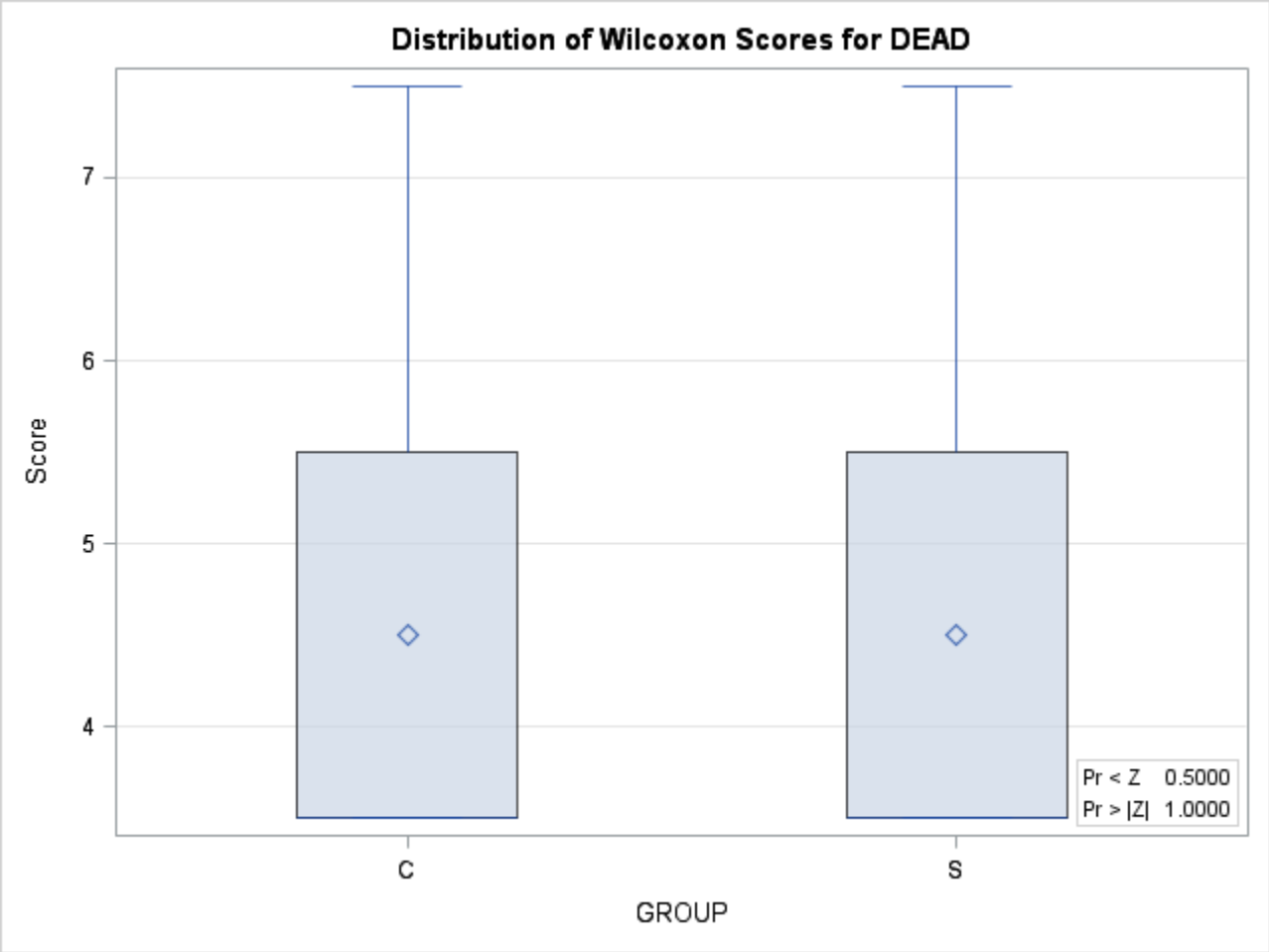
t Approximation

One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0000
DF	1
Pr > Chi-Square	1.0000


Distribution of Wilcoxon Scores for DEAD
Score
7
6
5
4
C
S
GROUP
Pr < Z 0.5000
Pr > |Z| 1.0000

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=1

Wilcoxon Scores (Rank Sums) for Variable DEAD
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	20.50	18.0	3.0	5.1250
S	4	15.50	18.0	3.0	3.8750

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	20.5000

Normal Approximation

Z	0.6667
One-Sided Pr > Z	0.2525
Two-Sided Pr > |Z|	0.5050

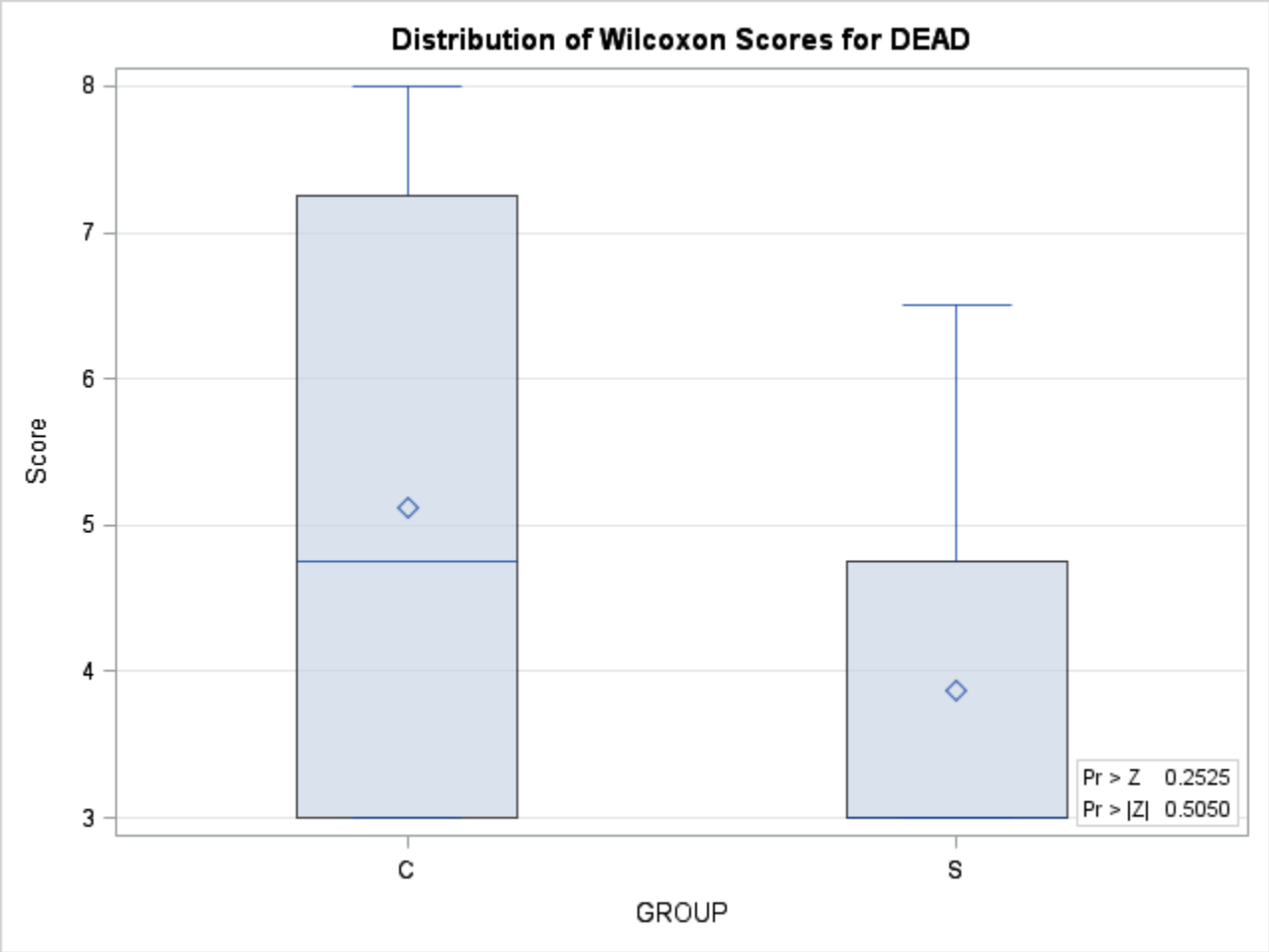
t Approximation

One-Sided Pr > Z	0.2632
Two-Sided Pr > |Z|	0.5263

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.6944
DF	1
Pr > Chi-Square	0.4047


Distribution of Wilcoxon Scores for DEAD
Score
8
7
6
5
4
3
C
S
GROUP
Pr > Z 0.2525
Pr > |Z| 0.5050

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=3

Wilcoxon Scores (Rank Sums) for Variable DEAD
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	21.0	18.0	3.359422	5.250
S	4	15.0	18.0	3.359422	3.750

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	21.0000

Normal Approximation

Z	0.7442
One-Sided Pr > Z	0.2284
Two-Sided Pr > |Z|	0.4568

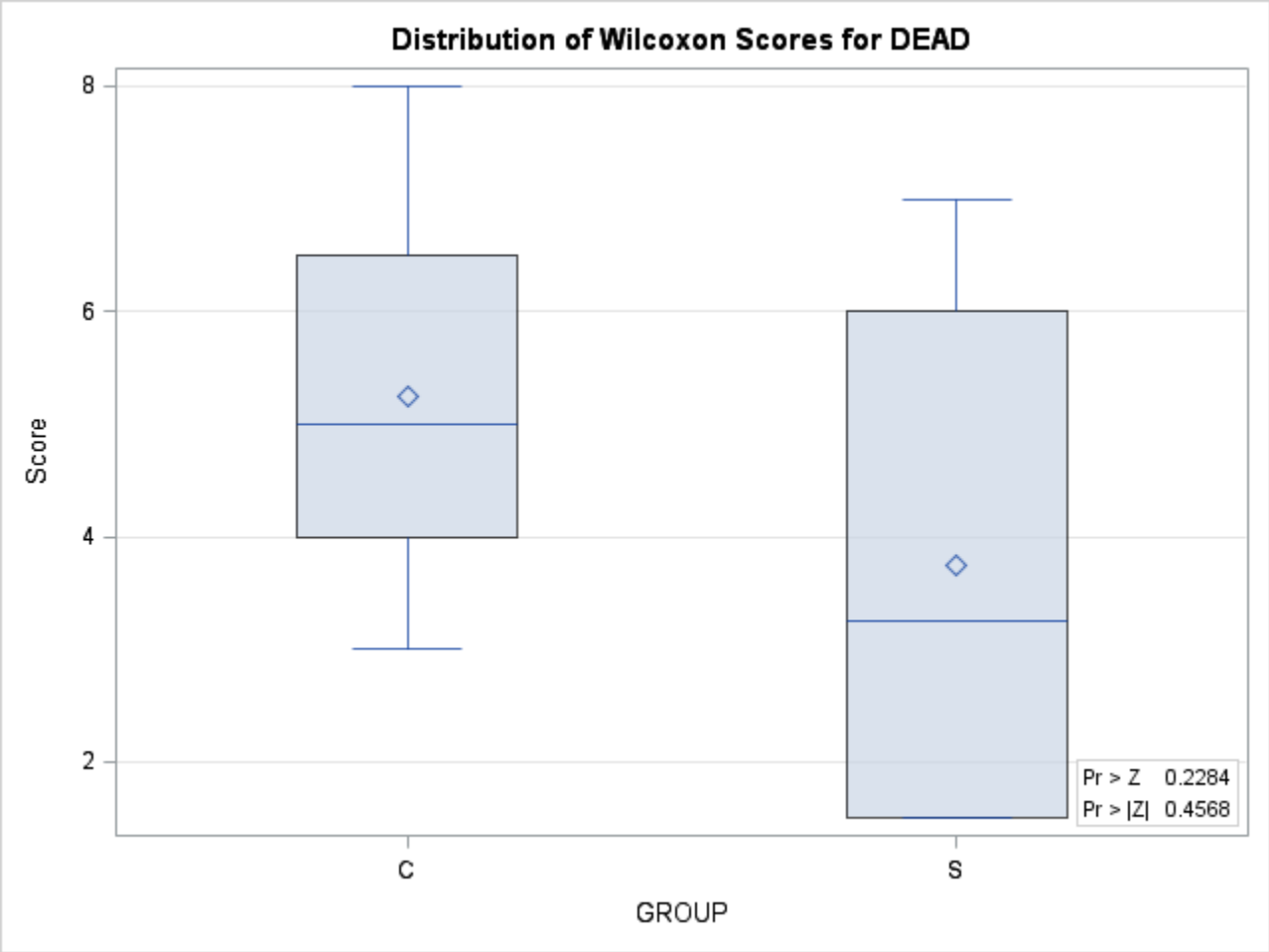
t Approximation

One-Sided Pr > Z	0.2405
Two-Sided Pr > |Z|	0.4810

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.7975
DF	1
Pr > Chi-Square	0.3719


Distribution of Wilcoxon Scores for DEAD
Score
8
6
4
2
C
S
GROUP
Pr > Z 0.2284
Pr > |Z| 0.4568

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=5

Wilcoxon Scores (Rank Sums) for Variable DEAD
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	22.50	18.0	3.401680	5.6250
S	4	13.50	18.0	3.401680	3.3750

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	22.5000

Normal Approximation

Z	1.1759
One-Sided Pr > Z	0.1198
Two-Sided Pr > |Z|	0.2396

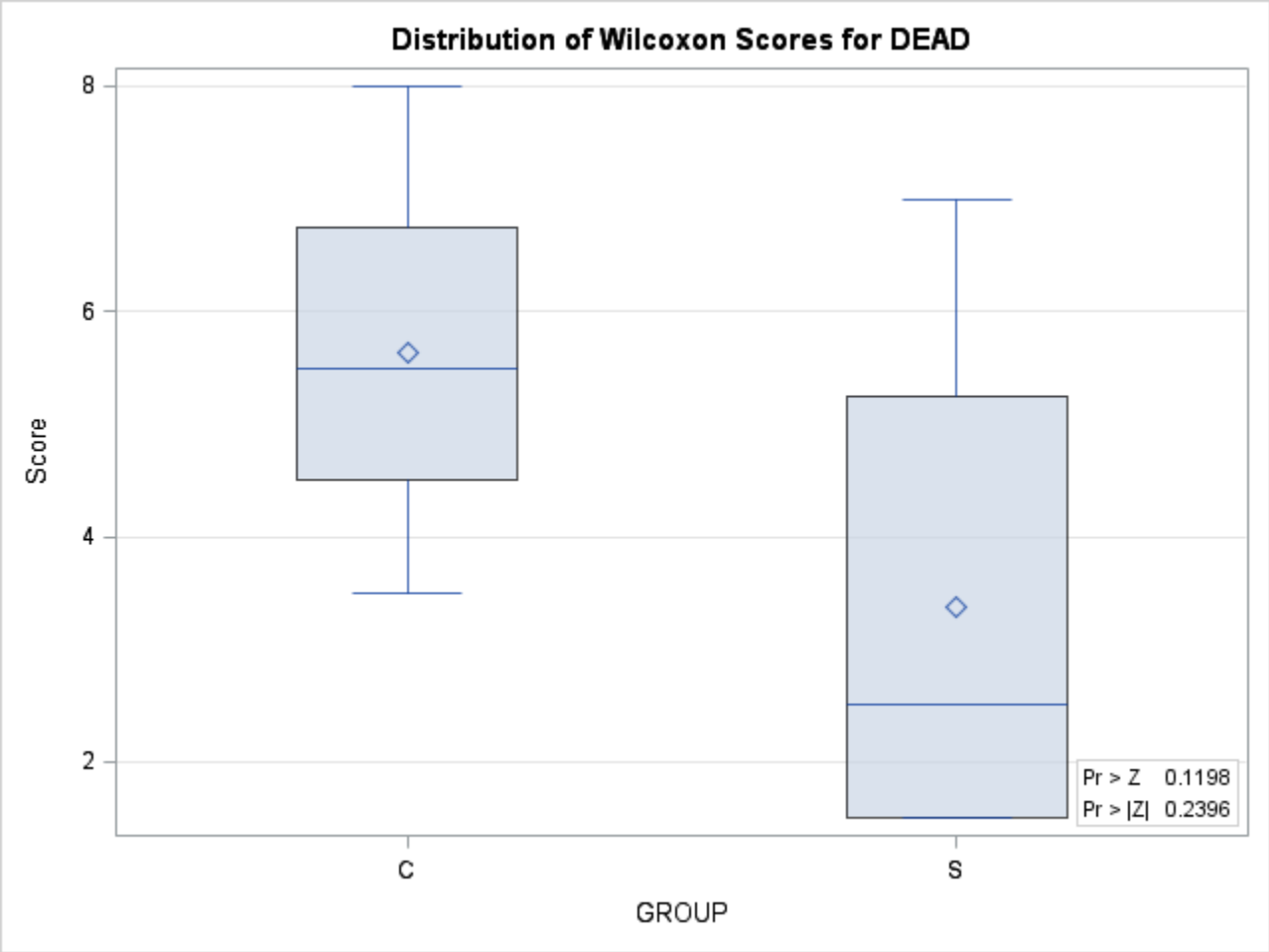
t Approximation

One-Sided Pr > Z	0.1390
Two-Sided Pr > |Z|	0.2781

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	1.7500
DF	1
Pr > Chi-Square	0.1859


Distribution of Wilcoxon Scores for DEAD
Score
8
6
4
2
C
S
GROUP
Pr > Z 0.1198
Pr > |Z| 0.2396

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=7

Wilcoxon Scores (Rank Sums) for Variable DEAD
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	18.0	18.0	3.359422	4.50
S	4	18.0	18.0	3.359422	4.50

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	18.0000

Normal Approximation

Z	0.0000
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

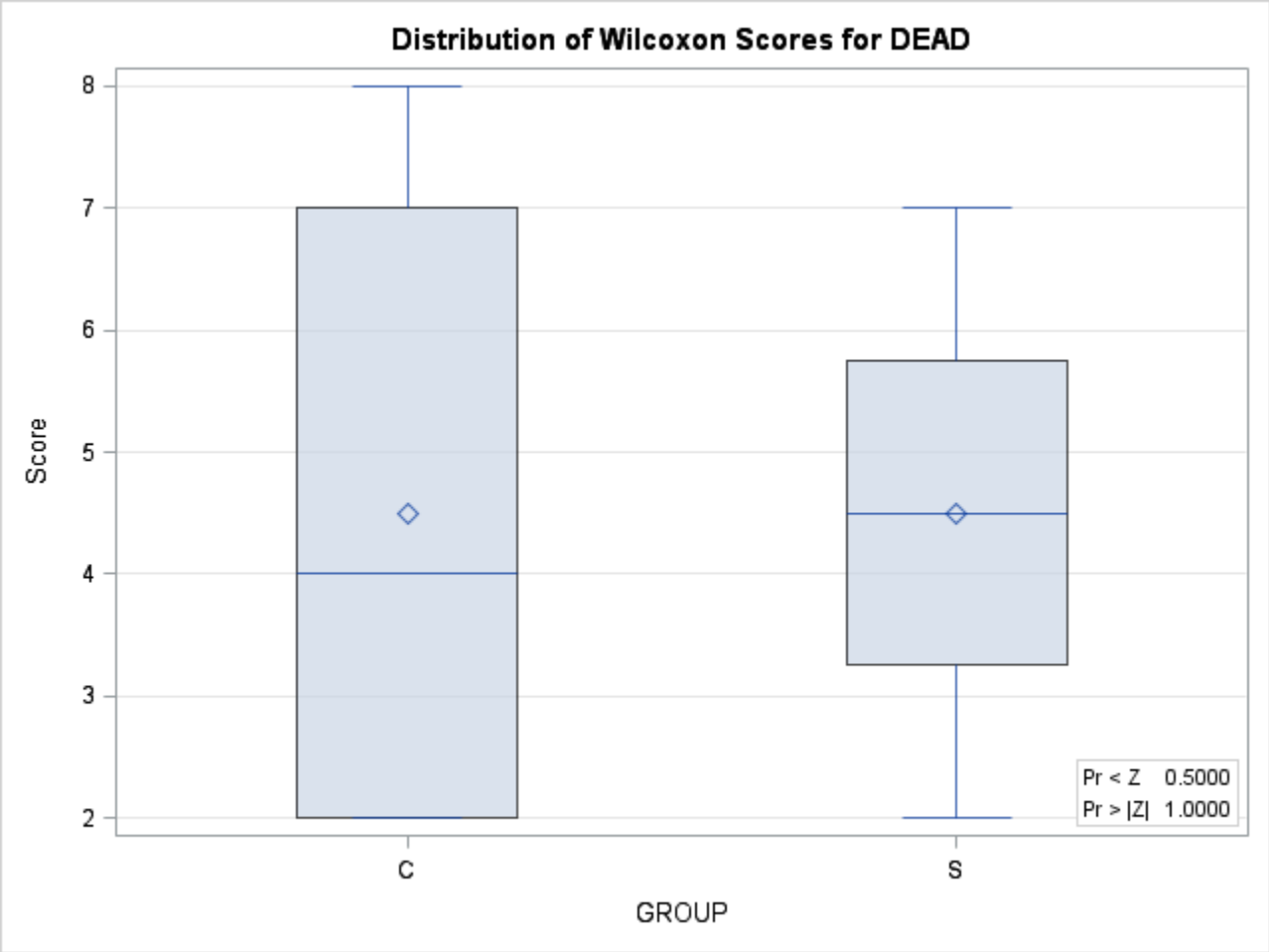
t Approximation

One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0000
DF	1
Pr > Chi-Square	1.0000


Distribution of Wilcoxon Scores for DEAD
Score
8
7
6
5
4
3
2
C
S
GROUP
Pr < Z 0.5000
Pr > |Z| 1.0000

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=10

Wilcoxon Scores (Rank Sums) for Variable DEAD Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	20.0	18.0	3.338092	5.0
S	4	16.0	18.0	3.338092	4.0

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	20.0000

Normal Approximation

Z	0.4494
One-Sided Pr > Z	0.3266
Two-Sided Pr > |Z|	0.6532

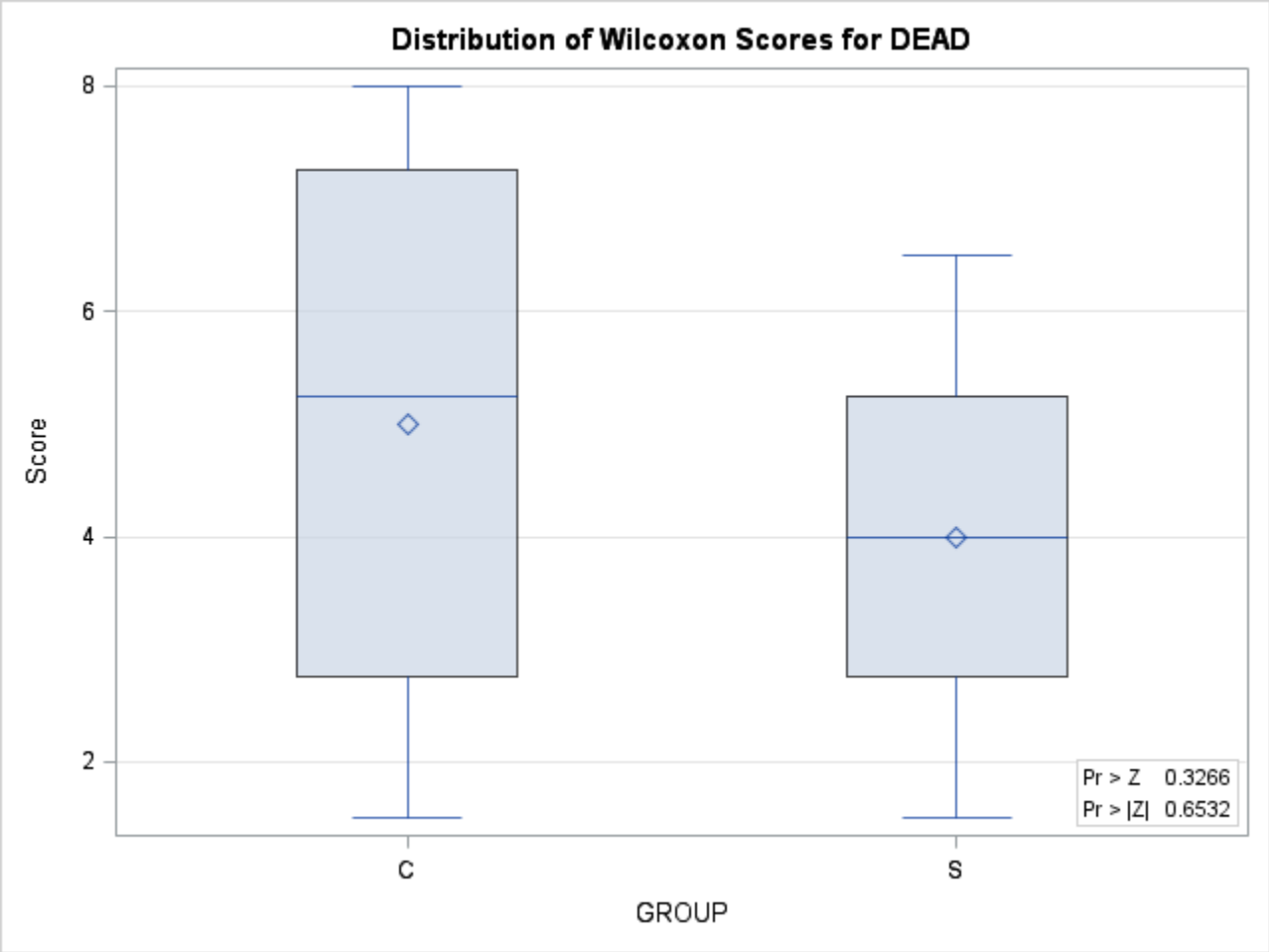
t Approximation

One-Sided Pr > Z	0.3334
Two-Sided Pr > |Z|	0.6668

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.3590
DF	1
Pr > Chi-Square	0.5491


Distribution of Wilcoxon Scores for DEAD
Score
8
6
4
2
C
S
GROUP
Pr > Z 0.3266
Pr > |Z| 0.6532

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=13

Wilcoxon Scores (Rank Sums) for Variable DEAD Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	19.0	18.0	3.338092	4.750
S	4	17.0	18.0	3.338092	4.250

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	19.0000

Normal Approximation

Z	0.1498
One-Sided Pr > Z	0.4405
Two-Sided Pr > |Z|	0.8809

t Approximation

One-Sided Pr > Z	0.4426
Two-Sided Pr > |Z|	0.8852

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0897
DF	1
Pr > Chi-Square	0.7645


Distribution of Wilcoxon Scores for DEAD
Score
8
6
4
2
C
S
GROUP
Pr > Z 0.4405
Pr > |Z| 0.8809

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=17

Wilcoxon Scores (Rank Sums) for Variable DEAD
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	15.50	18.0	3.229330	3.8750
S	4	20.50	18.0	3.229330	5.1250

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	15.5000

Normal Approximation

Z	-0.6193
One-Sided Pr < Z	0.2679
Two-Sided Pr > |Z|	0.5357

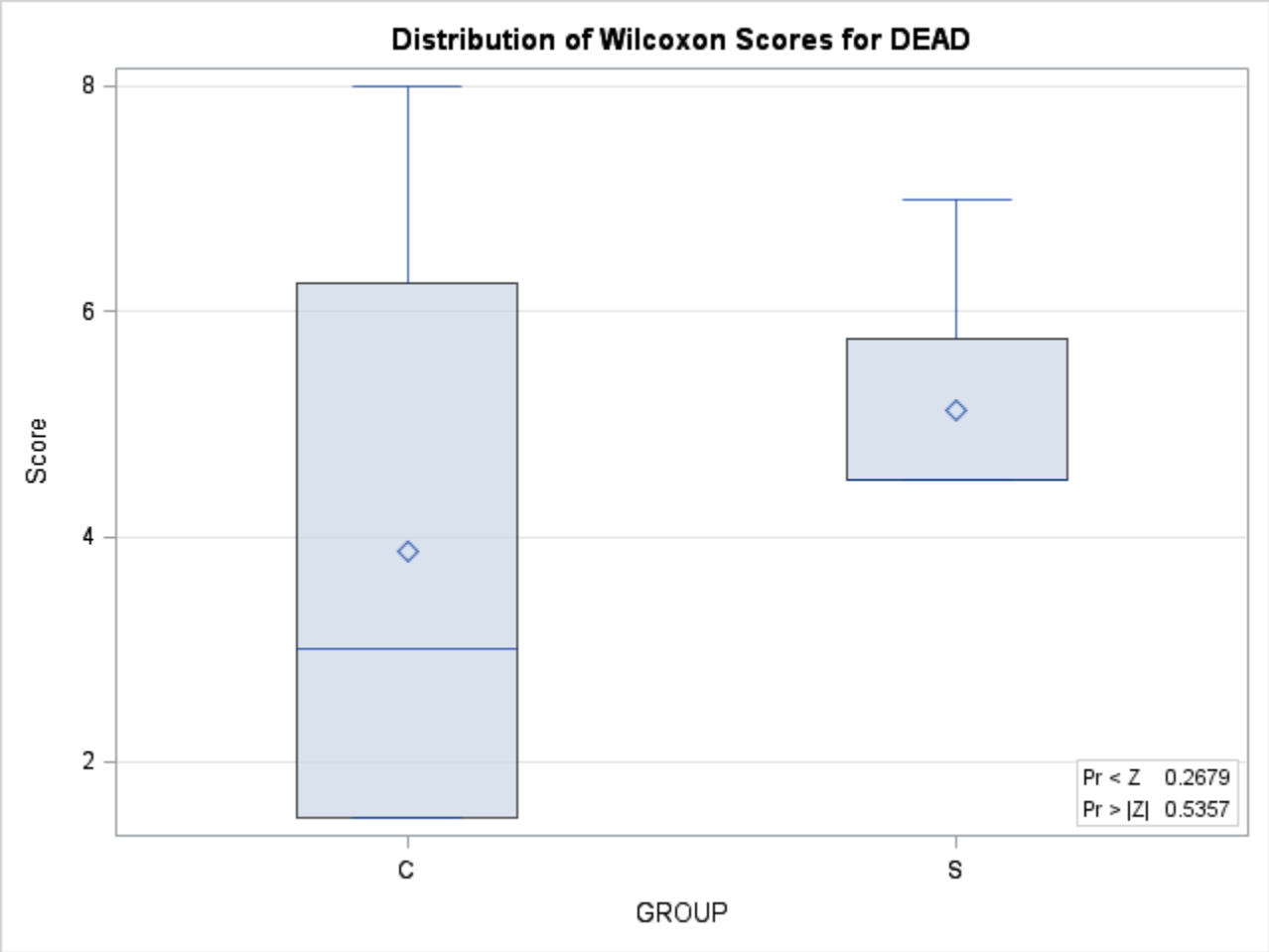
t Approximation

One-Sided Pr < Z	0.2777
Two-Sided Pr > |Z|	0.5553

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.5993
DF	1
Pr > Chi-Square	0.4388


Distribution of Wilcoxon Scores for DEAD
Score
8
6
4
2
C
S
GROUP
Pr < Z 0.2679
Pr > |Z| 0.5357

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=21

Wilcoxon Scores (Rank Sums) for Variable DEAD Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	17.0	18.0	3.0	4.250
S	4	19.0	18.0	3.0	4.750

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	17.0000

Normal Approximation

Z	-0.1667
One-Sided Pr < Z	0.4338
Two-Sided Pr > |Z|	0.8676

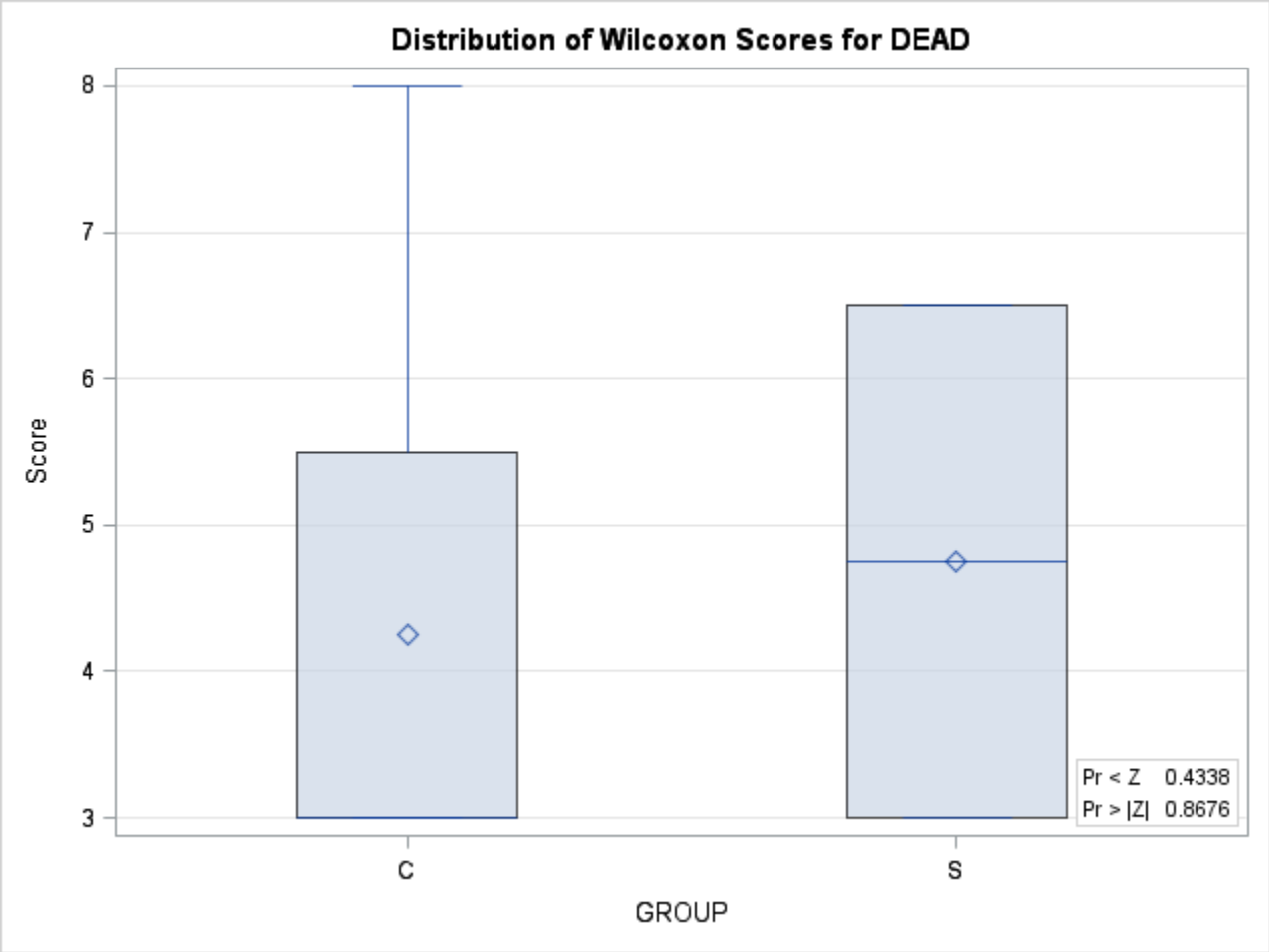
t Approximation

One-Sided Pr < Z	0.4362
Two-Sided Pr > |Z|	0.8723

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.1111
DF	1
Pr > Chi-Square	0.7389


Distribution of Wilcoxon Scores for DEAD
Score
8
7
6
5
4
3
C
S
GROUP
Pr < Z 0.4338
Pr > |Z| 0.8676

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=24

Wilcoxon Scores (Rank Sums) for Variable DEAD
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	21.50	18.0	3.338092	5.3750
S	4	14.50	18.0	3.338092	3.6250

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	21.5000

Normal Approximation

Z	0.8987
One-Sided Pr > Z	0.1844
Two-Sided Pr > |Z|	0.3688

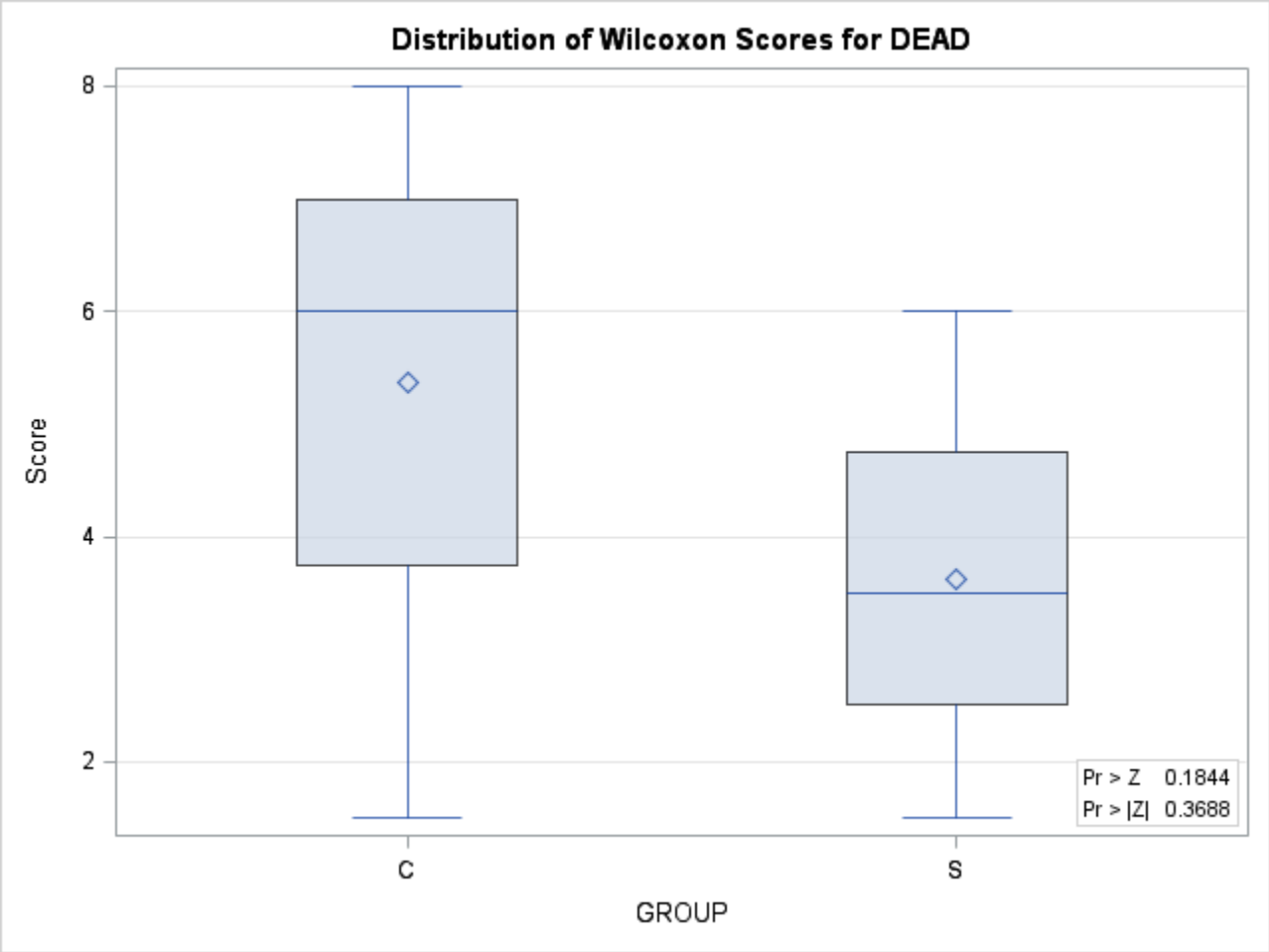
t Approximation

One-Sided Pr > Z	0.1993
Two-Sided Pr > |Z|	0.3987

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	1.0994
DF	1
Pr > Chi-Square	0.2944


Distribution of Wilcoxon Scores for DEAD
Score
8
6
4
2
C
S
GROUP
Pr > Z 0.1844
Pr > |Z| 0.3688

NONPARAMETRIC COMPARISON OF NUMBER OF DEAD BEES AT EACH DAT

The NPAR1WAY Procedure
DAT=27

Wilcoxon Scores (Rank Sums) for Variable DEAD
Classified by Variable GROUP

GROUP	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
C	4	17.50	18.0	2.645751	4.3750
S	4	18.50	18.0	2.645751	4.6250

Average scores were used for ties.

Wilcoxon Two-Sample Test

Statistic	17.5000

Normal Approximation

Z	0.0000
One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

t Approximation

One-Sided Pr < Z	0.5000
Two-Sided Pr > |Z|	1.0000

Z includes a continuity correction of 0.5.

Kruskal-Wallis Test

Chi-Square	0.0357
DF	1
Pr > Chi-Square	0.8501


Distribution of Wilcoxon Scores for DEAD
Score
8
7
6
5
4
C
S
GROUP
Pr < Z 0.5000
Pr > |Z| 1.0000